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[Founded in 1849 as the "Journal of Gas Lighting."]

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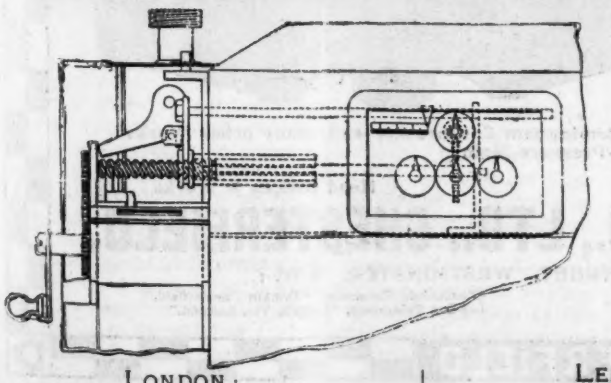

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLI., No. 2993.] WEDNESDAY, SEPTEMBER 22, 1920. [72ND YEAR.

EDITORIAL NOTES.

Zoning and Grading in the Gas Industry.

THE zoning and grading scheme is making headway. The matter is of considerable importance to all concerned, and particularly, it is sincerely believed, to the cause of justice and peace in the gas industry. The Executive Committee, upon which each district of the Federation of Gas Employers is represented, have been entering into the matter very earnestly with the representatives of the Trade Unions. It was announced in the "JOURNAL" on Sept. 8 that a draft scheme had been drawn up, and that the Regional Councils were considering it, after which the Joint Executive Committee would again meet. Upon inquiry, we learn that this meeting has been held, and the regional bodies have the matter under further consideration. To-morrow it will be before the Joint Industrial Council for the industry. Until, however, there has been complete confirmation, nothing definite as to the scheme can be made public. There is another matter connected with the same subject to which attention should be drawn. It is understood that some gas undertakings are delaying the return of the wages questionnaire that has been sent to them. This is not the way to facilitate the work; and it is a matter of urgency that the information should be available at once to the Gas Employers' Federation, in order to enable progress to be made. Holidays have probably caused some delay, and troubles have been inflicting themselves upon the managements of gas undertakings with uncomfortable intensity. However, holidays are ending, and it is hoped that the clouds are lifting a bit; so that an immediate response to the request for information will, we are sure, be much appreciated at headquarters.

The Coal Crisis—In the Balance.

THE few hours that lie between the time of writing and the receipt of this issue of the "JOURNAL" by our readers will be momentous ones for the country. It is with the profoundest regret that we cannot write more definitely as to the prospects of peace between the Miners' Federation and the community generally, as represented by the Government. But inflexible obstinacy on the part of the leaders blocks the way at the moment. Hope rose high on Thursday in the belief that there was a break in that obstinacy when, at the interview with the President of the Board of Trade, there was a renunciation of the claim for a 14s. 2d. per ton reduction in the price of domestic coal, though the leaders of the Federation put upon it the condition (which it is fair to them to say they did not press unduly) that the Government should hold an inquiry into the matter of reducing the price. It soon became apparent, however, that this was merely a sop to the Government, and was to be taken to show that the miners' leaders were in a conciliatory frame of mind, and had planned the way for a compromise —on their own terms, and without any investigation as to whether those terms were justified. They set themselves totally against entertaining the idea that the Government are at the present time trustees in the coal business for the country. If they would only admit this fact, and not arrogate to themselves so much in the way of final decision, things would soon be in a happier condition for themselves and the whole country.

The illogical and unreasonable attitude of the leaders was further demonstrated at the resumed conference on Friday. Though they wanted an inquiry into the question of the reduction in the price of coal, they made it a condition precedent to anything else being done that the flat-rate increase of 2s. in wages should be granted, without inquiry; and with a promise that the 2s. should not fall upon the domestic consumer. This is really the only rock on which the hope was split of averting a strike and disaster. All the argument that Sir Robert Horne (who, by the way, is possessed of an extraordinary fund of patience, generosity, and the right spirit with which to meet a stubborn situation) could advance would not cause the miners' leaders to admit any such simple and rational principle as that a claim for wages must be justified before it can be granted, and the justification should be made before an impartial tribunal. The leaders were so confident of the righteousness of the claim, that they would not concede the need for investigation; but their very confidence should have led them to a ready and unqualified acquiescence. A ready and unqualified acquiescence, however, has not had place within the rules of policy or conduct of the Miners' Federation since Mr. Smillie took the helm; but opportunism and a subtle scheming now predominate in most things the leaders do. The relegating to the background of the 14s. 2d. reduction in the price of domestic coal was not the only sop they presented to Sir Robert Horne, as representing the Government. They believed that an excellent lever to the concession of the 2s. flat-rate increase in wages would be the offer to discuss subsequently—not before—plans for consolidating and reorganizing payments on the basis of output, with a view to influencing greater production. In other words, they wanted the 2s. to form part of the basis, before considering the systematizing of wages in relation to output, and not to leave the 2s. in doubt, or to be earned before realization on the part of the men. We should have been more than pleased had it been possible to have announced that our latest news was that artifice had been pushed aside, and that the miners' leaders had resolved to throw in their lot with the country in the desire to help to relieve it from the grave repressive conditions under which it is labouring; that help being rendered on terms (arranged by a competent tribunal) which honest men know to be right and proper. The Government cannot betray those for whom they are trustees. The Miners' Federation Executive and delegates were meeting again yesterday; and the Triple Alliance will assemble to-day to decide upon the action they will take in the matter of support for the miners.

Prior to the Above.

THE foregoing is the position as we are preparing for press; and developments are rapid nowadays in such a nationally vital matter as this. The forepart of the week was full of interest; and the incidents had a big effect in bringing the miners' leaders to seek the interview with Sir Robert Horne on Thursday. Strong as the miners' leaders felt themselves to be at the close of the previous week when, in company with their fellows of the labour world, they were applauded, and the applause acted as a reinforcement to their resolve, their return to official position, and to direct dealing with a situation fraught with terrible disaster, revealed realities to them. They saw a Government unbending and unyielding, and preparing for the worst, with at their back a people unanimously resolved not to allow democratic government to be ground under the heel of Mr. Smillie and those who follow his lead. The events of the next day or two also showed the leaders that they had hopelessly blundered in the despotic attitude they had taken up; and then they began to look—having themselves slammed-to the door opened for them by Sir Robert Horne a week before—for crevices through which to creep out of the mess without suffering more loss of dignity than they could help. But what made things worse for them was that the miners were evincing no conspicuous enthusiasm over the position in which the leaders had encouraged them to place themselves; and they

also began to recognize what had not come within the range of their comprehension before, that the voices of their peers in other trade unions are not necessarily the voices of those who really constitute the labour world. The course that the Miners' Federation were pursuing was the one that would have shaken the trade union edifice to its very foundations. Recognition of these things cleared the air a bit, and helped to change somewhat (though there was reluctance to make the disclosure) the frame of mind of those who originated the proposed great gamble, which was either to raise them in power, or let them in for a fall from which there would be no recovery.

It was a bombshell that was dropped at the doors of the Federation on Tuesday morning, when the whole country saw from the White Paper published by the Government how grave had been the miscalculation of the Federation of the profits on exported coal, and how unreliable are reckonings based on irregular quantities. The paper was for the three months' coal trading to June 30. It showed that of the 58,144,000 tons of coal raised (after deducting mine consumption and that for miners' use), there remained 52,200,732 tons for disposal, or a decline on the previous quarter of 3,420,146 tons. In raising the 58,144,000 tons, £88,121,952 was spent, of which £66,570,490 was actually paid in wages to mine workers other than the managerial staff. The net profit in the June quarter was only £750,000! This illustrates the folly of estimating—as the Federation leaders have been doing—on uncertainties, instead of waiting for ascertained facts. Spreading the producing costs over the coal left for disposal, they averaged 33s. 6·98d. per ton; and of this 25s.5·72d. went in wages! A specious reply came from the Federation headquarters. But the Federation assessment of the intelligence of the public is as far wrong as their computations of the surplus profits on exported coal, They pointed out that, as compared with the previous quarter, the wages cost had only increased, as a result of the advance in wages which began on March 12, by 12·2 p.ct., timber and stores costs by 14 p.ct., while the costs of management, salaries, insurance, repairs, office, selling, and general expenses by 46 p.ct. Statements of increases in percentages for comparison purposes have only value when the bases are relative in magnitude. When the total figures are examined from the point of view of per ton of disposable coal, the wages increase becomes 2s. 9d. per ton, stores and timber 8d., and other charges 9d. The Federation also commented on the increased expenditure on development at the collieries. This is something for which they should be thankful, because in their defensive armoury they have kept well in view the excuse that want of mine development was the real cause of reduced production. No doubt it is so partially; but the public are not to be beguiled into believing that this is the root and only cause. The public know better. They have the best of causes. The leaders themselves have absurdly but seriously said that nationalization would enliven the men, and their improved spirits would cause coal to come over the top at an accelerated speed. And Mr. Smillie himself has asserted—and that most emphatically and unpatriotically—that the miners would not increase output if the profits on the additional coal were to be utilized in extinguishing part of the National Debt. The miners fortunately are not all moved by the same mental mechanism that animates Mr. Smillie. But there seems to be no particular pleasure in the head places of the Federation that colliery development is proceeding, as this excuse for declining output will not have any substantial validity for very much longer.

Alongside this bombshell came a letter from the Premier, which was more welcome to the Federation. It contained something which (though perfectly well known before) some of the miners' leaders thought would supply them with a key with which to unlock the door to negotiation. The words which gave so much delight announced the intention of the Government to maintain control of prices so long as it was necessary to protect home consumers, which means until export prices drop to figures having an approximation at the pit head with those applying to home consumption. This statutorily provided-for condition publicly stated gave satisfaction, though it followed the reiterated intimation of the Government that they would not receive any instructions as to the selling price of coal from anyone but Parliament—not even from the most powerful trade union. The Miners' Federation leaders were hoping that their preparations for the threatened approaching flood of disaster would have weakened the Government's attitude. The Government, however, knew that there were principles at stake here in regard to which any weakness or giving way on their part would have been a gross betrayal of the country.

The week, too, saw Mr. Smillie essaying, by writing to the papers, to put himself and the miners right with the public. He gained little from his performances; but his letters have helped the country to appreciate that some of Mr. Smillie's utterances should have a meaning attached to them diametrically opposite to the one they literally convey. He has told the country what good fellows the miners are, and how they deserve all they get. No one quarrels with that, providing there is a fair equilibrium between output and pay. What the public are peculiarly concerned over, however, are the unstatesmanlike qualities of which the leaders of the miners have shown themselves possessed. Mr. Smillie told the public in his letter to "The Times" that this is not a fight for nationalization; and the statement at Wrexham, "we [the Federation leaders] are determined to have nationalization," rises up and solemnly rebukes Mr. Smillie. The claims, too, over which all the trouble arose, the same authority avows, are not a political move. Then what was the meaning of the demand for the reduction in the price of coal? The Federation welcome the announcement of the Government that there is no intention of decontrolling the price until things have settled on to a better basis. But anteceding this, the Federation claimed the right to say how surplus profits were to be disposed of; and part of the scheme was the reduction of the price of domestic coal. Mr. Smillie and his colleagues are beautifully illogical in these matters. Much has been said by them as to wages; but if they would now leave the dead past, and take their stand upon present conditions, there would be less confusion of thought on their part, and certainly less obscuring of the position, the central feature of which is the 25s. 5·72d. paid last quarter as wages per ton of disposable coal.

There is another point in addition to nationalization that Mr. Smillie has made clear; and this touches the desire for greater output. The Federation are willing to have the medley of standard wage, percentages, war wage, and the Sankey award consolidated into one standard wage. But, says Mr. Smillie, this is a matter for times of industrial peace—not now. This is profoundly interesting, as it raises the question of what the Miners' Federation leaders are doing in helping to secure lasting industrial peace. If the consolidation of the constituent elements of the miners' payments is a right and proper thing, then no time can be so good as the present to bring it about; and it would be a big and worthy achievement. There are difficulties; but as we said last week, mine and coal conditions that affect output are subject to adjustments. However, this all shows that up to the interview with the President of the Board of Trade, thought had drifted into more rational channels; and it is to be hoped that the lessons of these times will have an immediate and a long salutary influence in the counsels of labour.

Changes in the Provision of Town Gas.

THOSE of our readers who do more than skim the matters reported in our news columns will have found last week, in the annual report of the representatives of the Sheffield Corporation who sit upon the Board of the Gas Company, something to arrest their attention, and possibly to sharpen consideration of the changes that are coming about in the economics of gas provision. In the first place, it has been known for some time that the Company have been receiving a supply of coke-oven gas. In this case, it is from the coke-ovens of the Tinsley Park Colliery; and those who have been following intelligence on the subject will be aware that the Company have been making provision for a further supply from the Orgreave Colliery. The report informs us that the main that will convey gas from the latter place has already been laid; but delivery of gas has not yet been commenced. The use of coke-oven gas for town supply is a development that is being contemplated in many places other than in the cities and towns—conspicuous among them being Middlesbrough and Leeds—that have now a good experience of such a supply. The second supply arranged for by Sheffield tells a tale of satisfaction, both technically and commercially.

There is, however, another item of information in the report that is of unusual interest. It is that a million cubic feet unit of plant on the Tully system is being installed, as an experiment, at the Neepsend works. The Tully plant

was prior to the war regarded among gas technicians as something that was suitable possibly for small works. During the war it became for others a perfect godsend, on account of coal, labour, and money difficulties. Now we see a company of the rank of that at Sheffield about to experiment with this million cubic feet unit of Tully plant, which means that they have their eyes on what is practically complete gasification as an auxiliary to the other methods of meeting the gas requirements of their supply area. The report says it is expected with the plant to produce a much larger quantity of gas per ton of coal, and at less cost than by any of the plants in operation; that it will occupy less space than retort-settings of equal gas output; and that, if it proves satisfactory, it may not be necessary to erect a new works at Wadsley Bridge for many years to come. The production of more gas per ton signifies much more than is hinted at in the report. It means the purchase and handling of only about one-third the quantity of coal that is ordinarily required; and this represents something in labour and plant. The reference to the postponement (if the plant proves successful according to the standards of the Sheffield Gas Company) of the erection of the new works raises visions of a fortunate delay in the expenditure of a large amount of capital; and in these days of high costs for material, labour, and capital, this is not a negligible matter. The ultimate test of success of a gas-producing system is the financial one; and this has yet to be ascertained by Sheffield with the new plant by the compilation of a complete and comparative balance-sheet from coal out to the surplus net profit, after making all charges, including those for capital, with an analysis of the gas on the therm basis. The Tully plant is mentioned only because it is the one on which Sheffield is going to experiment; but we have no care whatever as to the type of plant, or as to who is the inventor, so long as it represents progress in efficient working, and therefore advantage to the gas industry. The law as to the survival of the fittest holds as good in carbonizing plants as in other things; and we have to bow to the law, no matter what may have been our predispositions, which sometimes are proved by experience to have had a mistaken foundation. In these initial stages, however, we seem to detect the processes of complete gasification, urged forward by the conditions of the times, taking a good share of the field offered by the smaller gas-works, and obtaining an entry into the larger works as an auxiliary, and, where there are deliveries of coke-oven gas, also as a stand-by.

We hope to hear in due season more of the experiences of Sheffield with the new plant. In the current position of affairs, the industry wants to know all about the making of B.Th.U. in the form of gas at the lowest possible net cost. This is the work required of the technicians of the industry to follow on, supplement, and complete the authorization which the Board of Trade have been empowered by Parliament to confer on statutory gas undertakings.

The "B.A." Fuel Economy Committee and the Board of Fuel Research.

THE "Chemical Trade Journal" has published an editorial article which begins with the observation that "an extra-"ordinary state of affairs seems to exist between the Fuel "Research Board and the Fuel Economy Committee of the "British Association." The article is founded entirely on the *ex parte* statements of Prof. Bone, the Chairman of the Committee, which, it would appear from the final sentence in the article—"to say the least, the position is an undigni-"fied one for any public department to take up, having "regard to the special circumstances in this particular "case"—our contemporary accepts without reserve, or without any idea crossing its editorial mind as to whether there may not exist something which would tone-down the picture it has had before it, and upon which single presentment it has based judgment. We refrain from judgment for this very reason, and more because of the fact that we know the men who constitute the Board to be of the foremost standing in the scientific, industrial, and trading world, and men of high integrity, and that they have associated with them men of first-place chemical and physiological attainments. This can be said without in any way minimizing our respect for the scientific work of Prof. Bone. To most questions, however, there are two sides; and we are not persuaded that the Board would follow any particular line of conduct without some substantial reason. The opportunities that Prof. Bone has taken to censure the Board and their so-called attitude with regard to the Fuel Economy Committee of the British Association, particularly in respect of the subject of gas standards, are to be found recorded in the volumes of the "JOURNAL." His grievance seems to be that the Board have not given the resuscitated Fuel Economy Committee greater recognition, and have not looked upon them as indispensable counsellors in the work entrusted to the Board and their technical staff by the Department of Scientific and Industrial Research.

It is not part of our functions to defend the Board of Fuel Research. They are quite capable of doing this themselves if they seriously thought there was anything over which to make a defence, and which it would not be undignified on their part to notice. The Fuel Economy Committee, or Prof. Bone (he appears to be the head directing the movements of the body), has however taken up an attitude—not at the request of the public nor of any representative governing body—in relation to the gas industry in respect of gas standards which contemplates the imposition upon it of fresh restrictions. Two of these are to be the subject of inquiry—inerts and carbon monoxide. When this inquiry comes along, the Fuel Economy Committee—we take it through Prof. Bone again—are going to press to be heard. Now there is not a single matter which has been raised by Prof. Bone or the Committee that has not been considered by the Board, or in respect of which—and particularly the question of carbon monoxide—any new facts have been advanced by anyone that have warranted (making examination from all points of view) the Board submitting recommendations in regard to it. The Board have, there can be no question whatever, read what Prof. Bone, as a chemist and physicist, has had to say on the subject at the Society of Arts, twice at the British Association meeting, and at an interview with Sir Auckland Geddes; and no interview with them on the subject could have put the old knowledge more clearly before them. It is also quite safe on our part to say that they know what experience over a long course of years has to say on the subject, and that the bugbear that Prof. Bone has been so sedulously nursing, and has dressed up in ugly raiment, assumes quite a different aspect in the light of that experience. Our contemporary refers to what the Chairman of the British Association Fuel Economy Committee had to say last year on the subject of the so-called "ignoring" of the Committee as a "somewhat "bitter complaint." It finds that since then "the relation-"ship between the two parties has by no means improved;" and that, at the meeting of the Association the other week, "Prof. Bone's language" was "no less strong than last "year." It says positively that proferred co-operation by the Committee has been refused, and that the Board have gone about certain aspects of their work with, apparently, a studied determination to ignore the existence of the Committee. It instances the conference on the Board's report on gas standards to which all who had direct representative interest—local authorities, railway companies, and the gas interests—were invited to send their experts. But the Fuel Economy Committee seem to have been deeply hurt that they were not also invited to be present, although representing no one but themselves other than in their own imagination. Why they should consider that they ought to have been specially selected for invitation, we have not the faintest notion. We are not aware that committees of any of the learned societies were invited to attend. It seems to us that there is a great deal of nonsense and little substance about this question of being ignored; and if there is any strained feeling at all, it is visible only on one side.

The question is, Why should there be a strained feeling? We cannot answer it; nor can we find an answer in the "Chemical Trade Journal." Perhaps it underlies certain facts in our modern history. If it does, then only those concerned can reveal it. We dip into the records. There it is seen that, at a meeting of the South Wales Institute of Engineers at Cardiff towards the end of 1916, Prof. Bone stated that there was some idea that the work of the British Association Committee on Fuel Economy might be taken over by the Scientific and Industrial Research Committee of the Privy Council. In the spring of 1917, we announced the appointment of the Board of Fuel Research, with Prof. Bone as consultant. The statement was also made that the Board were taking over the work of the Fuel Economy Committee of the British Association, of which Prof. Bone was Chairman, and that the information so far collected by, and the plans of, the Committee would be available for the

guidance of the Board. We have not heard that this work has been relinquished by the Board, although the British Association resuscitated the Committee whose work was apparently transferred. In the report of the Advisory Council of the Committee for Scientific and Industrial Research noticed by us in September, 1917, Prof. Bone's appointment as Consultant to the Board was again notified; and in the report it was anticipated that the Director of the Fuel Research Board might anticipate the active help of the gentlemen who had been members of the Fuel Economy Committee of the British Association.

This all promised a long, close, and helpful co-operation between Prof. Bone and the Board. But in the "JOURNAL" for Oct. 15, 1918—only some eighteen months after we first intimated that Prof. Bone was to be the consultant to the Board—our "Personal" notes included the announcement that he had asked to be relieved of his duties as consultant, in order to be free during the then coming winter to devote his attention to plans that were under consideration for the post-war development of the Department of Chemical Technology at the Imperial College of Science and Technology. At the same time, it was stated that he would resume his private consulting and other work in fuel technology which had been suspended during his tenure of office. The resuscitation of the Fuel Economy Committee of the British Association followed (with Prof. Bone as the Chairman), though the Board of Fuel Research still exists. Then the activity—the speeches, and the Fuel Economy Committee's proposed new fetters for the gas industry which were adumbrated in Prof. Bone's Cantor Lectures, and the complaints of want of recognition. That is the chronological sequence of events. Beyond them we know of nothing more. But the position is that the gas industry wants to get on with its new work, and to keep the wheels of progress in public service free from unnecessary brakes; and, in doing this, it desires to serve fuel economy, which we believe to be the real object for which the Fuel Economy Committee of the British Association was appointed.

Not Betrayed, but Served.

We are not sorry that a gas stockholder sent the letter for publication in last week's issue, which appeared over the *nom de plume* "One of the Betrayed." The letter is evidence that the unpleasant experiences of the gas industry in the past few years have caused at any rate some gas share and stock holders to take a more pronounced interest in the affairs of the industry than when they were the recipients of a comfortable dividend. "One of the Betrayed" has made a complaint, and has had his grumble. What he had to say, and our comments upon his letter [p. 558], may have caused many other gas proprietors to consider the position (a position so far confined to the South Metropolitan stockholders), and they may have come to the conclusion that on balance the position is not such a bad one, in comparison with what has been—in fact, that the promise is that time will give back largely, if not completely, all that the fearful break in the world's peace took from them. The other side, and the rational view of the South Metropolitan Company's financial revision scheme, is expressed in our "Correspondence" columns to-day by another stockholder, who in this instance is not at all reticent about signing his name. Mr. C. B. Read correctly states the position; and his letter forms a useful supplement to our own comments of a week ago. Our correspondent of last week (who thinks that he and others have been betrayed by the South Metropolitan Act going forward with 5 p.ct. dividend attached to the existing ordinary stock and 6 p.ct. to new ordinary stock) does not allow any value for the safety afforded by the fact that the 5 p.ct. is a minimum, and that the Directors have the power now to maintain that minimum, whatever the prevailing conditions. There are not many commercial undertakings that can do this, whatever the times and whatever the demand. Moreover, there is found protection to the concern and to the existing stockholders in the ability to offer 6 p.ct. on the new ordinary capital, when this is regarded in conjunction with the redeemable preference and debenture powers which will bridge-over the time of extraordinarily dear money. In this connection, we pause with pleasure over Mr. Read's optimistic paragraph which commences with the words: "When money is again at (say) a 4 p.ct. price;" and we leave the words wondering what is likely to be the duration of time that the "when" covers. However, we are so much in agreement with Mr. Read that there is little in his letter upon which to comment, but much in it which merits support. The fact that not a single letter has reached us during the week endorsing the views of "One of the Betrayed," indicates to us that there are few (if any) gas share or stock holders who regard themselves in that category. It should be the business of existing holders of gas stock to do all they can to promote the flow of new money into the industry under its new legislative conditions, and not by word or action to stem that flow. Their own interests do not lie that way; and in this view, it will be seen, Mr. Read very fully concurs. [A letter from Dr. Carpenter, received just as this issue of the "JOURNAL" was being made-up for press, appears on p. 622.]

Gas Preference and Loan Capital.

In our review (completed to-day) of the Gas Acts for last session, it will be noticed that in some cases the powers to borrow have been raised to one-half of the share capital for the time being issued and paid-up. Parliament has no objection to this proportion now. There are several precedents for it in recent Special Acts; and a sub-section of clause 1 of the Public Utility Companies (Capital Issues) Act gives complete ratification to the higher proportion. It says: "Where the Special Act authorizes the creation and issue of debenture stock or the borrowing of money to a limited extent, [a company may] create and issue debenture stock or borrow money to an extent not exceeding half the share capital for the time being issued and paid up." Some companies, however, still adhere to the one-third proportion. The financial powers in Special Gas Acts also now frequently repeal the existing limits as to dividend and interest on respectively preference capital and borrowed money, and leave the directors free to determine the rates of dividend or interest at the time of making an issue. The text of the Public Utility Companies (Capital Issues) Act was published on p. 657 of our issue for June 8 last; and it is indicative as to what can be done through a Special Act as well as under its powers.

Exported Coal and Coke.

A substantial curtailment in the quantity of coal shipped is again shown by the Board of Trade returns for August. During the month, only 1,847,403 tons left these shores, compared with 2,170,813 tons in August, 1919, and 5,819,162 tons in August, 1913. During the eight months of the year, 18,375,932 tons were shipped, as against 24,161,423 tons in the corresponding period of 1919, and 48,320,608 tons in the same period of 1913. The sale of coke abroad is being well maintained. During August 175,145 tons were exported, contrasted with 149,399 tons in August, 1919, and 113,423 tons in the same month of 1913. In the eight months, no less than 1,320,379 tons of coke were shipped, compared with 862,468 tons in the corresponding months of 1919, and 712,698 tons in those of 1913. What will happen now that the portion of the coal used for making metallurgical coke for shipment abroad is to be charged up at the price of coal for export?

The Foreman Affair and the "E.T.U."

The upheaval that was threatened over the refusal of employers of members of the Electrical Trade Unions to bind themselves to engage foremen who were also members of the Union, and so abandon in that respect their freedom as employers—a matter that was referred to last week in our editorial on "Self-Determination or Dictation"—has ended, by mutual agreement, in a restoration of the *status quo*. So there has been all this fuss and dislocation of work through a demand that, to say the least, was absolutely void of reason; and nothing has come of it, except loss. The agreement justifies the employers in the action they took; and the abandonment of the demand by the Union is an act of wisdom before things reached a more serious state which enables a modification of the criticism that might have been made upon their former adherence to a proposal that no employer with any backbone or self-respect could have tolerated. The men on strike are to resume work; and the employers are going to unlock their doors again. This is satisfactory. There was no depriving the Metropolis of light, power, trams, and tubes last week-end; and so all ends as happily as can be expected in the circumstances. The Industrial Court inquiry has been adjourned, *sine die;* and the Court will complete their report, so as to make a finished job of the inquiry.

PERSONAL.

Mr. W. S. CURPHEY has, we learn, retired from the position of Chief Inspector under the Alkali Works Regulation Act, in connection with which he has done so much work of close interest to the gas industry—particularly on the direct process of sulphate making. Mr. Curphey, after having been in entire charge of the work in Scotland, became Chief Inspector in the year 1910, upon the retirement of Mr. R. Forbes Carpenter. It may be added that Mr. Carpenter had occupied the position for some fifteen years—having succeeded in 1895 Mr. Alfred E. Fletcher, an announcement of whose death at the age of 94, by a strange coincidence appeared in "The Times" on the very day that the intimation of Mr. Curphey's retirement reached us. Mr. Curphey is succeeded as Chief Inspector by Dr. T. LEWIS BAILEY, F.I.C., late Inspector for Cheshire, North Wales, and part of Lancashire, who has established his office at Room No. 99, Cornwall House, Stamford Street, S.E. 1.

The Withnell District Council have appointed Mr. A. PENNEY Clerk, Surveyor, and Sanitary Inspector. Mr. Penney was elected to the office of Surveyor during the war; and for the past few years he has had charge of the Withnell Gas-Works, which position he has relinquished.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A MEETING of the Central Executive Board of the National Gas Council took place on Tuesday, the 14th inst., at No. 30, Grosvenor Gardens, S.W.—Mr. D. MILNE WATSON in the chair.

GAS REGULATION ACT.

It was reported that this Act received the Royal Assent on Aug. 4; but until the Board of Trade had issued the instructions as to procedure (upon the preparation of which they were now engaged), undertakings could not proceed with applications for Orders. It was hoped to issue further information to members within a very short time. Members were reminded of the decision of the previous meeting of the Central Executive Board, that a few representative cases should be selected by each District Executive Board for priority of application, in order to avoid congestion and consequent delay to all.

COAL STOCKS.

With regard to coal stocks, it was reported that the Council were in close touch with the Midland Co-Ordinating Committee of the District Coal and Coke Supplies Committees. Every case presented to them by the Council was being dealt with on its merits, and already an improvement had been effected as regards supplies, although too much could not as yet be promised in respect of quality.

It was satisfactory to note that the Coal Mines Department had issued a circular letter to the District Coal and Coke Supplies Committees throughout the country, stating that any complaints with regard to short weight coal deliveries should be dealt with in accordance with the ordinary law of contract. Collieries had also been warned that to withhold supplies in cases of dispute was not a reasonable attitude to adopt.

It was also reported that the Coal Mines Department had set up a Committee to investigate the question of increased factorage, which was to-day agitating the gas industry, upon whom the charges consequent upon the creation of new factors and agents by collieries fell heavily.

It was pointed out that the Price of Coal (Limitation) Act, 1915, having expired, control over the rates of privately-owned wagons was removed; and it was suggested that in future the rate to be charged for these wagons should correspond with that charged by the railway companies.

The advisability of the insurance of their coal stocks by gas-works was pointed out.

MINING INDUSTRY ACT, 1920.

The scope of this new Act was outlined, together with the first Order issued under the Act, to take effect as from Sept. 1, 1920. Attention was drawn to the fact that, under section 3, sub-sections 1 and 7, power was given to the Board of Trade to regulate the export of coal and coke until Aug. 31, 1921.

COKE EXPORTS.

With regard to the refusal of the Coal Mines Department to grant licences for the export of coke, it was pointed out that no gas undertaking applied for such a licence until local requirements had been first provided for; and the Council decided to continue to press the Midland Co-Ordinating Committee for specific instances in substantiation of the general charge which they had made that, in some districts, gas undertakings were failing to meet the local demand for coke.

RAILWAY RATES.

Referring to the revision of railway rates recently in force, exception was taken to the absence of a fixed maximum rate for the conveyance of pitch. The same injustice showed itself in the case of the railway rates on bricks. The Council are pursuing the matter; and it is hoped that the Ministry of Transport will remove this anomaly.

GAS COOKERS, METERS, SPENT OXIDE.

It was reported that a meeting of the Standardization Committee appointed by the Council to investigate the question of the standardization of gas cookers would be called at an early date.

Resolutions were reported from various districts of the Council, asking for further information as to the costs of the proposed standard sizes of dry meters as compared with the cost of the standards already in use.

The recent advance in the price of new meters and in the cost of repairs was referred to; and the attempt to make the latter charge retrospective from July 17 was strongly deprecated.

With regard to spent oxide, and the proposed scheme for co-operative purchase, it was decided to hold an early meeting with the National Sulphuric Acid Association.

BENZOLE.

On the question of benzole, it was felt that gas undertakings might find its extraction a profitable enterprise at the present time; and it was decided to investigate further the cost of benzole recovery. Mr. Tibbitt, the General Manager of the National Benzole Association, explained the relation of the Association to producers and refiners of benzole.

WORKMEN'S COMPENSATION INSURANCE.

A scheme of workmen's compensation insurance for the industry was outlined; and a small Committee was appointed to investigate the possibilities of the scheme.

CONTRACT PRICES AND THE S.B.G.I.

A suggestion that the Council should prepare and agree with the Society of British Gas Industries a monthly list of prices of the more important classes of material, labour, &c., to be accepted by gas undertakings and contractors as a basis for the final adjustment of contract prices, was felt to be extremely difficult to carry out on lines that would prove of value and give satisfaction to the industry as a whole. But it was suggested that in cases where the proposed contract price appeared to be excessive, the Council should be communicated with and an investigation made by them.

Forging with Gas.

One of Baltimore's recent acquisitions is a works where drop forging is carried out on a large scale. Referring to the plant in operation there, Mr. Thomson King says that before the forging processes can be begun the steel must be raised to a temperature ranging from 1500° to 2200°, depending upon the character of the steel, the size of the piece, and the nature of the work that is to be done. The fuels most generally used are coal, coke, oil, and gas. In the past, on account of the cheapness of coke and oil, very little forging, except small pieces and tools, has been done with artificial gas. When the company alluded to began to consider the question of the best fuel to adopt, the decision lay between gas and oil; and after a thorough examination of the advantages of both, they determined to rely upon gas. Four gas-furnaces have been built; and two of them are now working. When running at full capacity the consumption of the larger of these is about 3600 c.ft. of gas per hour, and of the other, one-half as much. Air-blast to the burners is furnished by a motor-driven fan-blower. Gas meets the requirements of a good forging furnace, and provides an ideal fuel. These requirements are: To heat the metal to the desired temperature evenly, economically, and with as little scaling as possible, and with the heat easily controlled by the operator.

Address of the Institution of Gas Engineers.—Readers will kindly note that, on and after Wednesday next (the 29th inst.), the address of the Institution of Gas Engineers will be No. 30, Grosvenor Gardens, Westminster, S.W. 1.

Broiling with Gas.—A new system by which steaks, chickens, chops, and other food may be broiled quickly is being introduced into hotels and restaurants in New York. It is known as the De Matteis broiler system. The apparatus is gas-heated; and it can be installed in 16 sq. ft. of space. One cook can operate it, with the aid of a helper during rush hours. It is possible to broil chickens sufficient for 900 people in an hour. The capacity is about 1000 individual steaks or 5000 pieces of bread an hour. Heat is supplied by means of gas-heated radiants, with the obvious advantages of cleanliness and constant temperature.

Crude Tar for Road Surfacing.—According to the "Canadian Engineer," although crude tar has in the past been used to a fairly large extent for road surfacing, very few engineers seem to favour its more general use. There is no doubt that refined tar is in itself a more suitable material, provided it can be obtained in adequate quantities and at a reasonable price; and, secondly, it is felt to be unwise to incur the loss of valuable bye-products that would occur if the practice of refining tar was abandoned. In Canada, refined tar has gradually taken the place of crude tar, it having been found that pavements built using the unrefined product were uneven in their wearing qualities on account of the variations in the quality and density of the tar used. This variation caused holes to form where the tar became brittle or had been burnt. Such places broke down a year or two after construction—thus causing an excessive amount of maintenance work on streets carrying the heavier traffic.

GAS ACTS FOR 1920.

[SECOND ARTICLE.]

WE complete to-day the sketch of the Acts referring to gas that were passed in the current session of Parliament. The Bills as promoted were reviewed on Jan. 13 and 20 last.

The ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY have received all the money authorization that they set-out to obtain—some £200,000 of ordinary capital; and the enlarged borrowing powers on the pre-existing capital authorization, including the increase of the borrowing power on the unissued capital authorized in 1906 to one-half part, which is also the proportion of borrowing powers allowed on the additional capital authorized by the present Act. Sanction to issue redeemable preference and debenture stock is conferred. Works powers are granted in respect of certain scheduled land, to which powers the one-third purchase restriction in respect of secondary products has been affixed. Annual meetings are provided for. The rest of the clauses are normal in modern gas legislation. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

The new lands and works powers required by the RUGBY GAS COMPANY have been granted, with all the incidental authorization, including a railway siding. The limits of supply have been extended as desired. The London and North-Western Railway Company have secured the insertion of protective clauses. As from Jan. 1, 1922, or the date when the Company commence to manufacture gas on the new lands, consumers in the parish of Bilton (where the new works will be situated) are to have gas at the same price as the consumers in the urban district of Rugby. The additional capital is the sum desired—£150,000, with one-third borrowing powers over the whole of the capital. The redeemable preference and debenture stock powers are allowed, as are also the sliding-scale clauses, with 7 p.ct. standard dividend on the ordinary stock and 6 p.ct. on the part issued as preference, and a 3s. 8d. standard price. Annual meetings will henceforth be held. The succeeding clauses are mostly ordinary ones, and embrace the profit-sharing and benefit funds provisions. [*Parliamentary Agents: Messrs. Lees & Co.*]

The SALFORD CORPORATION in a General Act of many parts obtained the powers sought to regulate the retail sale of coke. These were noticed on Jan. 13 last, p. 71. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

The SHEFFIELD CORPORATION ACT is a document somewhat abbreviated from the original Bill, through the withdrawal of the section relating to the purchase of the gas undertaking. Nothing appears in it now which specially appeals to our readers. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The SOUTH METROPOLITAN GAS COMPANY'S ACT, alongside the Gas Regulation Act, will help to make this session of Parliament historical in the annals of the gas industry. There is no occasion to review its clauses as the main parts were given *in extenso* in our issue for the 18th ult., p. 340. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The SOUTH SUBURBAN GAS COMPANY'S ACT is very thin compared with the bulk of the original Bill; but dimensions are no criterion of importance. The reduction in volume is due to the withdrawal of the sections referring to the heat-unit basis and financial revision in favour of proceeding under the Gas Regulation Act. The power has been conferred as to the construction and maintenance of works on certain scheduled lands at Erith, as well as the authority to purchase land by agreement. Additional capital is allowed up to £500,000, with a third borrowing powers. [*Parliamentary Agents: Messrs. Dyson, Bell, & Co.*]

The SOUTHEND GAS COMPANY have secured the extension of the limits of supply to which allusion was made when reviewing the Bill on Jan. 20 last; and the Rochford gas undertaking will pass into their possession under the agreement and terms then noted. It may be remembered that the Directors sought to repeal the dividend limit on preference capital which may be hereafter created under the powers of the Acts of 1904 and 1914; and they desired freedom in fixing the dividend at such rate as they deemed desirable at the time of issue. The proviso has been added that the rate of dividend shall be at a rate not exceeding 7 p.ct. per annum, except with the approval of the Board of Trade. The borrowing powers have been raised to one-half the paid-up capital; and the issue of preference capital or debenture stock as redeemable has also been allowed. The capital redemption fund plan has been substantially altered from the form of the proposals in the Bill. Now the provisions read as follows:

As on and from the 1st day of January, 1921, the provisions following shall have effect (that is to say):

(1) In any year in which the divisible profits of the Company shall exceed the amount required to pay the dividends on any preference capital of the Company, and a dividend at the rate of 5½ p.ct. per annum on the ordinary capital of the Company raised before the passing of this Act under the powers of the Act of 1904, and a dividend at the rate of £5 17s. 6d. p.ct. per annum on the ordinary capital of the Company raised under the powers of any Act passed previously to the Act of 1904, and a dividend at the authorized rate on any ordinary capital of the Company raised after the passing of this Act under the powers of the Act of 1904 or the Act of 1914 or any future Act, the Company shall transfer to a fund, to be called the "Capital Redemption Fund," any balance of such divisible profits which may be in excess of the sum required to pay such dividends.

(2) Any moneys standing to the credit of the capital redemption fund formed under the provisions of section 16 of the Act of 1914 shall be transferred to the capital redemption fund.

(3) So soon as the Company shall have transferred to the capital redemption fund sums which shall amount in the aggregate to £30,000, the provisions of this section shall cease to have effect.

The standard dividend on the ordinary stocks is 7 p.ct. per annum; but there has been a change in the standard price since the Bill was lodged. Within the existing limits, it is to be 5s. 3d.; and the sliding-scale is to operate half-yearly on the usual terms. The provisions of the section, however, are, in their application to any ordinary capital raised before the passing of the Act under the powers of the Act of 1904, to have effect as if the words "five shillings" were substituted in the section for 5s. 3d. There follows a provision which secures (after the expiration of one year, and before the expiration of five years) a reconsideration by the Board of the standard price on the application of the Company or the Southend Corporation; and the Board have the power to reduce or increase it by Order. If profits are insufficient to pay the full amount of dividends in any year or half year on each class of the ordinary stock, a proportionate reduction is to be made on each class of stock. In the added limits of supply, the price of gas to ordinary consumers "shall, for a period of seven years from the passing of this Act, be a price exceeding by 1s. 6d. 1000 c.ft. of gas" the price within the pre-existing limits; and after the expiration of that period, the price is to be such as "the Company think fit not exceeding by more than 1s. 6d. per 1000 c.ft., or by more than any such less amount as the Board of Trade may on the application of the Rochford Rural District Council determine, the price for the time being charged to consumers under like circumstances within the existing limits of supply. In the prepayment clause, the excess allowed is 1s. 3d. per 1000 c.ft. for meter and fittings, and 1s. 6d. if a cooker is included; but the charge for a meter alone is 6d. or 10 p.ct. on cost, whichever is higher. The Company's suggestion that the calorific standard should be reduced from 540 B.Th.U. to 450 B.Th.U. has been altered (by the powers that abhor change) to 500 B.Th.U. Presently the Company will be able to "declare" 450 B.Th.U. as their standard, with the approval of the Board of Trade. As to pressure, after the expiration of two years from the passing of the Act, the pressure of gas is to be (in any main or service-pipe of 2 in. diameter or upwards, except in the case of accident or repair) 20-10ths from sunset to sunrise, and from sunrise to sunset 15-10ths. But in the case of premises of the Midland and Great Eastern Railway Companies, the minimum pressure of all gas, in any main, or in any pipe between the main and the meter having an internal diameter of 2 in. and upwards, is to be 20-10ths of an inch at the primary meter or meters registering the supply. The clause that dealt with the heat-unit basis of supply [quoted when reviewing the Bill last January] has disappeared, and so the Company will proceed through the Board of Trade in this matter, as nothing in the Act is to exempt them or their undertaking from the provisions of any General Act passed in this or any future session of Parliament. The profit-sharing and pensions clauses have been sanctioned. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The SUTTON COLDFIELD CORPORATION ACT includes clauses referring to the retail sale of coke in lots of 2 cwt. and under. They are all in the usual form. [*Parliamentary Agents: Messrs. Baker & Sons.*]

The TREDEGAR DISTRICT COUNCIL ACT entitles them to charge for gas a price not exceeding 8s. per 1000 c.ft. The figure in the Bill was 6s. 6d.; but since last November, things have changed for the worse in regard to costs. The Act also confers power to buy and supply coke-oven gas. [*Parliamentary Agents: Messrs. Lewin, Gregory, & Anderson.*]

The UXBRIDGE, WYCOMBE, AND DISTRICT GAS COMPANY'S ACT provides for the transfer to the Uxbridge Company of the undertaking of the High Wycombe Gas Light and Coke Company, Ltd. The limits of supply of the Uxbridge Company are extended. In the added area an additional 6d. per 1000 c.ft. may be charged; but the extra sum is not to be taken into account in calculating the rate of dividend payable under section 41 of the Uxbridge Gas Act of 1906. The transfer is on agreed terms. Preference stock is to be issued in substitution for the shares of the Wycombe Company. To each holder of original shares of £5 (entitled to a standard dividend of 10 p.ct. per annum), £10 of preference stock will be issued; to each holder of original shares of £2 each, £4 of preference stock; to each holder of additional shares of £5 (entitled to a standard dividend of 7 p.ct.), £7 of preference stock; and to each holder of preference shares of £5 (entitled to 5 p.ct.), £5 of preference stock. The preference stock so issued is to be entitled to a preferential dividend of 5 p.ct. The debenture stock of the Wycombe Company will become a charge on the Uxbridge and Wycombe Company. Power is given to create and issue the necessary amount of 5 p.ct. preference stock: and this will rank for dividend from Jan. 1, 1921. The dividends will be paid as usual at the authorized rates for the current half year. There are a number of incidental clauses. Among them is one providing for the compensation of the Wycombe Directors—the amount being the "equivalent to seven years' purchase of the gross amount which during the year 1919 was the amount divisible among the Directors of the Wycombe Company by way of remuneration as such Directors." As to the compensation for Mr. Harold Baker, the Secretary and Manager, the amount is to be decided by agreement, or, failing agreement, by an arbitrator

appointed by the President of the Institute of Chartered Accountants. The borrowing powers are increased to one-half of the issued capital. The previous limit of interest upon borrowed money is repealed; and the limit of dividend on preference stock is removed—the rates in future being left to the determination of the Directors. Preference and debenture stock may be issued as redeemable. [*Parliamentary Agents: Messrs. Lees & Co.*]

The WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY have obtained the powers sought to construct, maintain, and use gasholders and other works for the storage of gas upon lands acquired by them; but the power to issue additional capital in the form of preference stock has been reduced from £500,000 to £450,000, with one-third borrowing powers. Annual meetings are provided for. Authorization is also contained in the Act to issue stock under the profit-sharing scheme. [*Parliamentary Agents: Messrs. Lees & Co.*]

ELECTRICITY SUPPLY MEMORANDA.

THE electrical industry is subject to the same internal ills as other industries through labour disorders. It has, in fact, had a fine dose of disturbance in this regard through its peculiar circumstances. Most of its labour is of the skilled order; and the skilled workers are well aware of the ease with which they can instantly spread disaster or inconvenience among those who in any way are dependent upon the supply of electrical energy, whether for light, power, or traction. Last week, London was wondering whether it was going to be deprived of the parts of its lighting and power that are electrically produced, and of its trains and trams that are driven electrically; and all over a matter in which the public and the greater part of industry have no concern whatever, save so far as they are getting more than tired of the flow of claims which the trade unions appear to be attempting to out-rival each other in maintaining, and in connection with which it is now abundantly clear that they are over-reaching themselves. The Electrical Trade Union have adopted the communistic idea that they, not the employers, should have a controlling voice in the selection of foremen in any works where Electrical Trade Union men are employed, by making it a condition that foremen should be fully matured and loyal members of the Union. To this communistic idea the employers declined to be parties; and so the members of the Engineering and National Employers' Federation resolved to put an end to the trouble by locking-out the members of the Electrical Trade Union, until the Union withdrew from meddling in a matter which is distinctly one for an employer to determine. Unions may declare strikes, but for the employers to indulge in a lock-out is repugnant to all trade union canons of propriety. The details as to the origin of the dispute and claim are well known. But because the Union could not have their way, and because the masters would not unlock their doors pending investigation by a Court of Inquiry appointed by the Ministry of Labour, threats began to pour out from the Trade Unions identified with the electrical industry as to what they would do in London if the employers did not climb down. Some of the Union leaders are just like a lot of spoilt, angry children in their behaviour and tactics. What on earth have the people of London to do with a dispute of this nature, that they should be the victims of this silly piece of trade union strategy? Their worst offence can be that the majority of them hold a strong opinion as to the gross stupidity of people who submit that the employer has not the right to determine whether he shall employ a man who may have qualifications for the post of foreman superior to those of a candidate who may be a member of a Union.

The Electrical Dispute.

A meeting of members of the Unions (called by the Electrical Trade Union) identified with the electrical industry in London—the electricity supply undertakings and the stations supplying railways and tramways—resolved to ask their Executives to give seven days' notice of a strike, so as to cut-off the electricity supply to the Metropolis. This highly intellectual proposition was put forward with the intention of causing a flood of trouble in London with the one idea of bringing pressure to bear upon the members of the Engineering and National Employers' Federation to settle this foreman question—of course, favourable to the Electrical Trade Union. Of all insane notions, this ranks second to the threatened coal strike, the main object of which was the forcing of a settlement moulded by the Miners' Federation upon a purely political issue. The Executives of the Electrical Power Engineers' Association, and the Workers' Union were not, however, in harmony with those who proposed extreme action, and would not consent to issue strike notices. We are not astonished. What we are astonished at is that any of the subordinate technical men should have been guilty of taking part in the recommendation made to their Executives. The rôle of the members of these Unions it was decided by the Executives should be a strictly neutral one, but that they should be loyal to unionism to the extent that they would refuse to supervise volunteers, or to do anything which was the work of a member of the Electrical Trade Union. In order to satisfy fads some men will destroy or interrupt that which is constructive and of sound sense; and these fads get in time hoisted by them to the false status of principles. Interlinking of electricity undertakings was a good constructive proposal; but the interlinking can be made worse than useless by the Unions, if they so will, just at the time when it would be most valuable. To use the interlinking system, in certain circumstances, would be, we are told, an infringement of trade union principles. Trade union principles must not be violated; but the dense population of London may be put to all manner of inconvenience by totally unprincipled methods in the defence of a single trade union fad. There is something uncomfortably wrong with the outlook of such people, and with their sense of proportion. We have seen in a morning paper an illustration as to what is meant by infringing trade union principles by having recourse to the facilities provided by interlinking. Supposing the Poplar station was unaffected by a strike of the members of the Electrical Trade Union, and the West Ham station was affected, any attempt to supply West Ham from Poplar would violate trade union principles, and the Poplar men would decline to be parties to any such outrage. When matters reach such heights in absurdity, then it is pretty certain that they will soon come tumbling down; and the sooner the better. Manufacturers will note that there are many virtues in private gas-driven electric plants, one of which is that they are independent of public supply, can have attendants who are not members of the Electrical Trade Union, and can supply current whether it be for lighting or power or both at an average figure per unit which the average price for equal service from the central station cannot touch.

Interlinking and Union "Principles."

[After the foregoing paragraphs were written, the contending parties by agreement retraced their steps to the position that existed before the rupture, and so peace has been restored.]

The "utility factor in domestic electric heating" is no doubt a very good thing if human nature was not so rebellious in following its own inclinations instead of doing its utmost to serve the electricity undertaking. However, the utility factor in domestic electric heating is the title of an article in the "Electrical Times," in which article there is little substance—not sufficient, in fact, to justify the title. What is advocated is that electric radiators should have a larger heating capacity than those usually fixed. The writer says there is practically no limit to the heating capacity of electric radiators. Of course, there is not. Heating appliances of any kind can be constructed to any desired size, from pigmy to mammoth. The only limits in the case of gas and electricity are the capacity of mains and cables to supply; and, in the case of electricity, the capacity of the pockets of the users. Of course, a physical difficulty is that a unit of electricity has only a potential heating value of 3420 B.Th.U., and a monetary one in that nowadays most undertakings want 2d. or 3d. for every unit extracted from their cables for heating purposes. We agree with the greatest cordiality that some radiators have hitherto been fixed that have been crudely at variance with the work they were expected to perform—not only in respect of room capacity, but of atmospheric conditions. A radiator that will suit a room quite well in the autumn will not suffice in mid-winter, or when icy winds are whistling round the house, and matching their strength against the slender amount of radiant heat that is trying to percolate the walls on the inner side. Structural conditions also have effect. Atmospheric and structural differences defy the application of any strict general formula. Electrical formulæ have always been pitched too low to cover all conditions and changes; and so have estimates. What really happens in connection with electric heating is that nobody troubles much about what is suitable for heating a room. A householder puts in what he fancies; and the electricians are quite pleased to allow him to do so. The heating range of a gas-fire is only limited by the amount of gas that will pass through the burner injector; and this can be modified by the turning of the tap. The incongruity between the heat afforded by an electric radiator and the maximum heat required is one of the two stools. We have spoken of reducing heat requirements to a formula. Some say a consumption equal to 1 watt (or 3·42 B.Th.U.) per hour is sufficient per cubic foot of room capacity; some regard 1½ watts as better. Investigators find that 2½ watts per cubic foot are often needed to meet the variations in conditions, and to give heat satisfaction in any circumstances. The writer on the "utility factor" urges that larger radiators should be the general practice—something in excess of ordinary requirements, which will heat up a room quickly by pouring into it electrical energy at 2d. or 3d. per unit. Big radiators have big appetites. The writer on the "utility factor" believes that, when a room is comfortably warm, people will switch-off some of the bars of the radiator. If it is a four-heating element radiator, they may switch-off two—leaving two incandescent and two dull, which would be terribly ugly. Our knowledge of people leads us to believe that, in the matter of heating in winter, the only thing that will make them switch-off part of a 3 or 4 KW. electric-radiator would be physical discomfort; and the electric bill will be an excellent lever to the final eviction of the radiator. In this matter of room heating, the electricity industry is between two stools; and if electric heating became really popular for domestic purposes, the industry would certainly find fresh difficulty arise which might alter its views on the subject of heating tariffs.

Between Two Stools in Heating.

Increasing Burden of Capital Costs.

A paragraph in an electrical paper gives the information that the total of the tenders accepted by the Oldham Corporation in connection with extensions to the electricity works is a great deal in excess of the amount put forward for sanction. The Town Clerk has therefore been instructed to apply for permission to borrow a further £22,578, which is not a small sum. This is one of the difficulties of public services to-day. There is nothing definite upon which they can proceed. Estimates are framed; but they have to be subject to change, and the change is generally in the upward direction. The uncertainty of the situation is marked by the fact that it is generally only the more imposing electricity concerns that are expending lavishly in new constructions or extensions. Other undertakings are confining themselves to making good, as and when contractors can attend to them, such plant ravages as time and enforced neglect during the war compel. There will have to be a great revision of trading operations and prices of current in connection with this new capital expenditure; for electricity generation is one of those things that claim the best and most expensive generating plant, if there is to be economical running. It is not the same as in gas production, where a water-gas or a complete gasification plant as an auxiliary can produce B.Th.U. in the form of gas at a lower cost per unit of production than ordinary carbonizing plant, and so gas supply can be supplemented at a reasonable outlay. Take Llandudno—the Electrical Engineer reports that one of the generating sets has broken-down, and will take some months to repair. It is not a happy condition, and an unhappier one is that the available plant is overloaded, and there is no stand-by in case of further breakdowns. The excessive load is due to increased traction demands; and for this purpose the energy is being sold at a loss to the Council. This being so, the Council cannot possibly bear additional outlay without raising their charges for, at any rate, traction purposes, or alternatively and unfairly putting an additional burden on the ratepayers. There is Skegness. The Council are considering a scheme of electricity supply; but Mr. C. H. Wordingham cannot hold out any prospect of the work being carried out for less than £44,000. The capital charges on a loan of this size for a town like Skegness would aggregate to something per annum upon which the Council cannot lightly venture. Capital charges form a large proportion of the annual outlay of an electricity concern; and new capital charges for electricity, with the expenditure on repairs and renewals, will make a bigger impression on electricity prices in future than most electrical people care to contemplate. These heavily increased obligations are supplementary to coal, labour, oil, and other operating costs.

Another Appeal for the "E.D.A."

The Electrical Development Association does not appear to be making much headway in securing new support. The electrical papers have been constantly pegging away at the matter of additional financing; and the Association once issued a propaganda pamphlet on its own account. The Incorporated Municipal Electrical Association have now taken up the question with their members, in order to stimulate a more substantial and more widely spread contribution to its maintenance. They appeal for generous support; and as the Municipal Electrical Association took a paternal interest in the birth of the organization, it is thought that it is only right the members should do all they can to put the Association into funds which will enable it to not only carry on, but increase the scope of its work. The Development Association has so far been an unfortunate. It was thought at the time of its birth that no time could have been more opportune for it; but the facts are the other way about. Its advent was in the midst of grave discontent, and costs and national financial burdens were and are of an unprecedented kind. Electrical undertakings—especially municipal ones—have been chary about entering into new financial obligations; and with the prices of electricity and the costs of wiring and apparatus at the level they are, the men responsible for those concerns see small chance of making any great progress with electric heating and cooking, which is the main line along which the operations of the Development Association can proceed. Moreover, the costs of printing and advertising—in fact, all expenses of such an organization—have risen; and whatever the Association touches, the outlay will be double or treble what it would have been before the war. In short, the Association was born in troublesome times; and the disadvantage of this has tenaciously adhered to it.

Vaporizing for Distribution Systems.—A pamphlet by Mr. B. R. Parkinson on "Vaporizing," which has just been printed by Messrs. W. Parkinson & Co. for private circulation among their customers, refers particularly to their new petroleum gas-heated vaporizer, for preventing naphthalene troubles and protecting meters and mains. The process of vaporizing recommended is fully explained, together with the apparatus itself; and it is pointed out that allowing as much as 12 grains of naphthalene to 100 c.ft. of gas, 15 gallons of paraffin burning oil are sufficient to deal with an output of 1,000,000 c.ft. of gas—or 20 to 25 gallons, allowing a margin for returns. It will be noted that the author advises the use of the apparatus throughout the year, and not only in the cold season, when naphthalene troubles are apparent—in fact, it is better to vaporize in summer than in winter.

THE COLLAPSE OF THE GADD GASHOLDER AT ILKESTON.

A German Allegation of Errors of Construction.

A recent number of the "Journal für Gasbeleuchtung" contained a note by Herr J. Schmidt, an engineer connected with a Dortmund firm of constructional engineers, in which attention is drawn again to the collapse of the Gadd gasholder at Ilkeston in 1912. It is pointed out that very full details of the catastrophe were given at the time in the "JOURNAL" for February 6, 1912, [Vol. CXVII., pp. 304, 354]; but it is added that no one attempted to trace the cause of it to errors of construction. Herr Schmidt then proceeds to the following critical study of the construction of the holder.

The accident occurred when gas was being delivered from the gasholder, of which the inlet valve was shut. The top lift was first seen to descend; and a big flame was noticed. The most important witness of the event was the works foreman, who (according to Herr Schmidt) saw the flame while standing at the door of his house, and then retreated with his family to the cellar, from which he was driven by the flood of water. The nearest flame was so far from the holder that it must be assumed that the gas was ignited by sparks caused by the jamming of the bell in its sudden descent.

The holder had a two-lift telescopic bell; and provision had been made for a third lift to be added later. The guide-blocks or carriages of the bottom lift, fixed to the curb of the tank, must have projected a long way inwards, as shown in figs. 1 and 3 of the accompanying diagram. But a Gadd holder, in wind or with a one-sided load of snow, produces very strong downward or upward vertical forces, P, in the roller brackets, and consequently great bending moments, Pa, would result on the plates of the tank. If, however, the inclined stays—those that are indicated by the dotted line in fig. 1—had been provided directly under the roller brackets, extending to the point A of the tank, the moments, Pa, would have been rendered harmless, because the vertical forces P_1 (previously referred to as P) would have been resolved into the forces K on the stays and small horizontal forces H tending to bend the curb (fig. 2). In place of these, however, there were short steel-plate brackets which extended below in a weak angle-iron prolongation. Even this feeble stiffening was entirely omitted on the lower plates of the tank. In this way, the whole of the bending moment must have been communicated in large measure to the tank plates. There was thus from the outset a tendency to distortion (fig. 4) of the curb, which was very weak (fig. 3) for a holder of this type of 453,000 c.ft. capacity—subsequently to be extended to 660,000 c.ft.

Fig. 2.

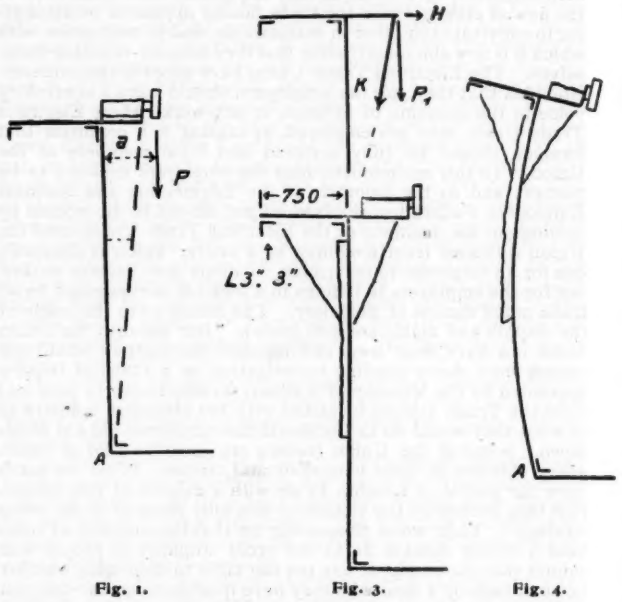


Fig. 1. Fig. 3. Fig. 4.

It is in the highest degree probable that jamming would occur between the lower roller carriages on the curb and the spiral guide-rails of the lower lift, which would thus interfere with the smooth descent of the lift. Moreover, the feeble curb of the tank was not strong enough to keep the holder circular. Consequently it is conceivable that sparks ensued from the deformation of the curb and lower lift causing jamming in the guides of the upper lift as well.

After the bottom lift had stuck, the considerably heavier upper lift descended of itself—thereby breaking the water-seal, and allowing the gas to escape. The top lift then descended suddenly, and produced sparks in its descent, which ignited the large

volume of escaping gas. As the top lift settled-down with great rapidity in the firmly jammed lower lift, it produced a violent impact on the plates of the tank, setting up enormous strains in the tank, and no doubt rupturing its sides, the sheets of which were lap-jointed, with two rows of rivets.

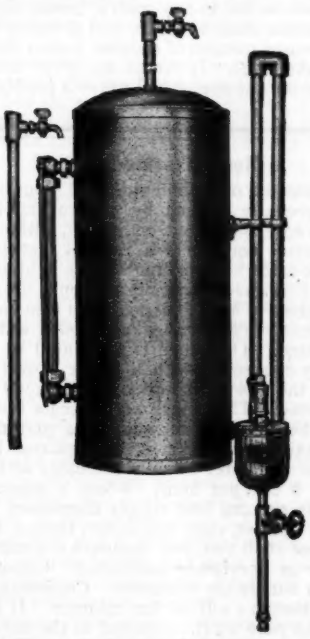
SECURING ECONOMY IN FUEL CONSUMPTION.

The Hays Appliances.

THE need for securing the utmost possible economy in fuel consumption—or, in other words, of working plants at the highest attainable point of efficiency—is realized to-day more generally than it has ever been before, as also is the fact that this end cannot be gained by rule-of-thumb methods, but requires the exercise of great care and the aid of appliances of extreme accuracy. The need being thus admitted, it is no more than natural that a continually increasing amount of attention should be given to available means. Numerous devices having for their object the saving of fuel in steam-raising and other plants are on view just now at the Machine Tool Exhibition at Olympia; and among them is a series of extremely useful instruments exhibited by the Duguid Instrument Supply Company, of Chapel Walks, Manchester, who act as European Agents for Hays fuel economy specialities.

There are four of these instruments to which it is desired here to draw attention; and mention may be first made of the Hays automatic gas-collector, which enables one, for the purposes of analysis, to obtain an absolutely average sample of gas covering any desired period up to 36 hours. It is pointed out that "snap" tests, particularly in the case of flue gases, do not give any indication as to the average efficiency of firing; and the information obtained by analyzing the sample in the gas-collector is of very much greater value. There is no unnecessary elaboration in this gas-collector. The problem is to draw off the gas at an even rate over whatever period may be fixed upon; and this is ensured by an ingenious form of water-flow regulator with which the collector is provided. By means of this a constant rate of discharge from the tank is maintained. That is to say, when the tank is full of water the outflow will be no faster than when it is almost empty, notwithstanding the difference in head.

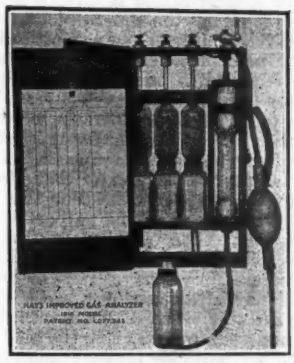
Connection having been made at the top with the cold-water system of the plant, the tank of the automatic gas-collector is about half-filled with water, and a pint of engine oil poured in. The oil will act as a seal to prevent the absorption of gas by the fresh water taken into the tank. All that has to be done then is to close the valve on the gas supply, open the gas-outlet cock, and turn on the water-supply valve. The apparatus then fills up with water, after which the water is shut off, and also the gas-outlet cock, and the gas-supply valve is opened. Everything is then ready for collecting a sample. Water flows from the tank into the regulator already referred to, and is discharged through



The Hays Automatic Gas-Collector.

a drip-cock—the rate of discharge being constant without regard to the level in the tank. The drip-cock is set just about to fill the tank with gas in the sampling period, whatever that may be; and for this purpose it is provided with a dial and pointer. When the desired rate of flow has been determined by experiment, the position of the pointer is noted; and thereafter the valve may be easily set for this rate at any time. At the end of the period selected for drawing off the sample, the gas-supply valve is shut, the water-supply valve is opened, and the water in the tank rises and displaces the gas through the gas-outlet cock, which has been opened for the purpose.

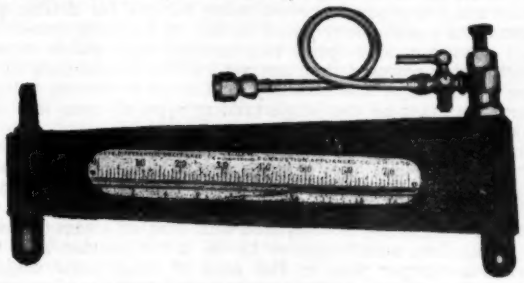
The next stage is the analyzing of the collected sample of gas. For this purpose there is the Hays patent gas analyzer, which, it is explained, is a much improved form of Orsat apparatus, and has no glass cocks or pinch-clamps; these parts being replaced by needle valves. The writer was assured that tests can be conducted with it at the rate of one a minute. Certain it is that the instrument is very strongly made, and admirably adapted for carrying about, being put up in a metal case the longest measurement of which is but just over a foot, and the weight, with the analyzer completely charged, no more than 7½ lbs. It is thus exceptionally suitable for consulting engineers and combustion



The Hays Patent Improved Gas Analyzer.

specialists. The analyzer is the outcome of many years of experiment and experience, and is claimed to be a successful attempt to bring the accuracy of the laboratory within reach of the engineer. There are no levelling devices, and the case can be hung up on a nail in the room where the analyses are being made. The instrument determines the percentages of carbon dioxide, oxygen, and carbon monoxide; and the solution used for the absorption of carbon dioxide can be employed for any other acid gas. When not used with the collector already described, there is an aspirator for drawing gas into the apparatus, which enables one to take a snap-test.

There are many positions in which a reliable draught gauge is of real value; and among those who are showing a practical interest in the Hays differential draught gauge, there are reported to be a number of gas engineers. This is provided with an adjustment for setting to zero, and also means for checking zero at any time when the gauge is in operation. The instrument is substantially made; and being graduated in one-hundredths of an inch, very fine readings can be obtained with it. There are two



The Hays Differential Draught Gauge.

principal types, one of which is used for natural draught, and a larger one for forced draught, with the zero in the centre, so that readings can be made of pressure and vacuum. By means of simple fittings, one can measure the loss in draught between two points, which permits a check upon air leakage. The gauges are in dustproof cases; and the assurance is given that they are absolutely sensitive.

Finally, there is the Hays patent automatic CO_2 and draught recorder. This furnishes a record on one chart of the draught and CO_2 analysis—the draught in the centre, and the CO_2 on the outside. In this instrument there are no moving parts at all except, of course, the pen-arms; and there are no adjustments at all to be made. It is guaranteed to an accuracy within one-half of one per cent. The gas is drawn through the instrument by an aspirator worked by water; and caustic potash is used as an absorbent. Nothing requires to be touched when once it has been set to work.

In marketing the four appliances briefly described here, the Duguid Company fairly claim that they are lending substantial aid in the direction of economizing fuel consumption.

Estate of the gross value of £6795 has been left by Mr. Edward M. Beecham, late Engineer and Manager to the Cirencester Gas Company, Ltd.

A CENTRIFUGAL-BAFFLE TAR EXTRACTOR.

There has been described by Mr. C. E. Reese, of Springfield (Ill.), in the pages of the "Gas Age," his own design of centrifugal-baffle cleaner, the object of which is to separate substantially all the solid and liquid particles from any gas or vapour. Special application is claimed for removing tar from artificial gas, oil and water from natural gas, and water from steam.

The extractor is based upon the principle that when two or more independent substances are passed through a space which has an external centre, the heavier or heaviest substance seeks a path on the longest radius; and the tendency for the substance to travel on the path of the longest radius is directly proportional to the mass of the substance times the square of the velocity at which the substances travel, and inversely proportional to the radius of the curvature of the path traversed. Dynamically speaking, the centrifugal force required to constrain a particle to a circular orbit is equal to the mass times the velocity squared, divided by the radius of curvature. It is the difference in weight of a particle of gas and a particle of tar that makes this extractor possible. The tar particles being heavier, therefore the value of the force imparted to the tar particle is greater than the corresponding force imparted to the gas particle. For this reason, the tar particle travels to the outside of the path, and strikes the perforated blades provided. The tar particles that strike the solid part of the blades deposit, while those going through the holes are in doing so increased in velocity. The gas particles, however, expanding immediately after passing through the perforations, make a change in direction of travel, leaving the heavier particles behind; and the gas takes a path along the bladeless part of the spiral space. The tar particles impinge upon the walls of the spiral and blades, and there deposit. Drops of tar are formed, which run down the spiral and blades, through holes in the plate supporting the spiral, and into the tar-chamber, from which they pass through a seal to the separator. Mr. Reese favours erecting the plant in quite small units, and placing them in parallel, because the smaller the spiral, the smaller the radius of curvature, and hence the larger the value of the centrifugal force throwing the tar particles against and through the blades. The point at which the separating force is the greatest is where the radius of curvature is least—that is, the centre of the spiral.

FUTURE OF LARGE GAS-ENGINES.

Writing in "Gas and Oil Power," Mr. W. Stead discusses the use of large gas-engines in connection with the proposed electrical super-power stations.

He says that with gas as the motive force the ideal arrangement would be to instal gas producers at each station, and to extract the bye-products, before using the gas for driving purposes. The gas-engine required for driving purposes would best be of 5000 H.P. slow-speed twin-tandem type, which engines, though higher powered than any yet built in this country to the writer's knowledge, are certainly capable of evolution, being a natural resultant of the single-tandem type of 2500 H.P. now actually in use in some works.

To drive a super-power station with load capacity of 100,000 KW. thirty of these 5000 H.P. engines would be required, without allowing for stand-by sets. The initial cost of installing these would necessarily be very great, as in addition to the cost of the machines themselves, as compared with that of steam-turbines, the foundations would require to be much heavier and the power-house larger than in the case of these latter engines. A further objection to running a super-power station on slow-speed type gas-engines would be the difficulty of operating satisfactorily in parallel with a neighbouring super-power station driven by steam-turbines, without introducing a specially-designed alternator.

On the other hand, the gas-driven power station would have the following points in its favour: The gas economy is easily better than steam plant; the power required for auxiliaries is much less; and for pure economy of coal the writer is satisfied that the gas-engine operated station would easily rank first, in spite of the fact that a Board of Trade unit is being obtained from 1¾ lbs. of coal, week in and week out, at a large steam-driven power supply company's station. The initial cost of the installation, however, being a deciding factor in the adoption of one of two or more alternative schemes in any establishment, it is evident from the above that the large gas-engine will not be used to any extent in equipping these proposed super-power stations.

There will, however, remain many works, &c., where the super-power station will not have access, through not being able to deliver a supply at a cheap enough rate, owing to expense and loss on line transmission, and to the establishments being in a position to generate more cheaply themselves—possibly due to their having waste gases from blast-furnaces and coke-ovens at hand. It is recognized by experts that, with an available load of 2000 H.P., a works may instal a bituminous gas plant and gas-engines, when working under recovery conditions, and obtain its power at a very low cost, especially if the load is continuous. The super-power station would find it difficult to offer terms to meet these conditions.

With such possibilities of cheap power at hand for private firms who instal their own gas-driven generating plant, one is impelled to ask the question, "Why have not more such plants been put down in the past?" The reasons for this are many and varied—the primary one, in the writer's experience, being that in many cases where such plant has been put down, those responsible for its running efficiency and upkeep have been without experience, and have not realized until too late that this kind of plant cannot be fooled with. Another very serious handicap under which such plants have been called to work is that the gas has not been sufficiently cleaned, either of its dust or tar content; and, again, the water supply has been unreliable or impure—all of which causes, militating against the efficiency of the plant, have tended to alienate it from favour.

Of vertical gas-engines of large size, the tandem four-cycle single-acting engine has practically monopolized the market. It was first designed and built by the writer about twelve years ago, when a 350 H.P. set was put to work. About five years later, 1500 B.H.P. sets were built for Japan, since when a great many of this size have been built. Owing to the extremely even turning movement, it is particularly suitable for driving alternators; no difficulty being experienced in paralleling with steam-engines or with turbines. The engines are compact and light for their power, and are very accessible; all main running parts being lubricated by oil under pressure. None of the reciprocating parts are water-cooled—only the cylinders and covers requiring this.

During the period of the war, two very large power stations have been equipped by the National Gas-Engine Company with large engines of this type, in each case for the generation of electricity. One, a Government factory for producing war munitions, has conditions ideal from a generating point of view. The horse power installed is 11,000; each engine driving a 230-volt direct-current dynamo. The gas, of excellent quality, is perfectly cleaned. Exhaust-heat boilers are coupled to the exhaust main from each engine; the steam generated being used in the producers. A central system for supplying filtered and cooled oil under pressure for lubricating the engines is installed. This arrangement has given marvellous results in economy.

The second installation erected by the National Gas-Engine Company is a combined station for the generation of electricity, and the supply of blast for blast-furnaces by gas-engine driven blowers. The engines are of the multi-cylinder, vertical, single-acting, four-cycle tandem type, of a total normal horse power installed of 12,000. They are coupled to alternators generating current at 5500 volts, three phase, 40 periods, with independent excitation. The whole of the engines take their gas from the blast-furnaces, after it has been suitably cleaned.

From long experience as a manufacturer, and later as a consultant on many large power schemes, Mr. Stead is certain that there is a very big future for the gas-engine, both at home and abroad. But it behoves contractors to insist on their best and most complete scheme being adopted, and for the purchaser when engine plant is running also to insist that it shall have proper attention and not be left to run until it breaks down, but that intelligent supervision shall be given, and at stated intervals (based on a pre-determined number of running hours) cleaning and overhauling shall take place. If things are given attention, and not allowed to drift, the gas-engine will prove a profitable and reliable prime mover.

Meter Testing in Situ.

Mr. W. A. Conway, of Wilmington (Del.), outlines in the "Gas Age" a plan recently devised by him to enable meters to be tested for accuracy, to satisfy a complaint, without removing the meter. The device consists of a vertical part (to be placed on the outlet of the meter) comprising a three-light meter-coupling, a nipple, then a ¼-in. gas-cock, another nipple, next a tee, nipple, and open jet pillar. The tee carries at its side outlet an ell-bend of metal, connected to a U gauge (containing water) mounted on a graduated board. The gauge is calibrated to 6 c.ft. per hour consumption by connecting with a meter prover or test meter, and closing-off the gas by the cock until exactly 6 c.ft. per hour is being consumed. Then mark on the scale the position of the water level. The principle on which the plan depends is that, whenever the gas consumption is so regulated by the gas-cock that the level of the water-column coincides with this mark, the consumption is 6 c.ft. per hour. When a consumer complains that his meter is running fast, simply disconnect the house-pipe, put on the *in situ* tester, read the meter, time it for as long as it is desired the test shall run, and compare the meter reading with the 6 c.ft. rate as previously calibrated. Generally the test is close enough to satisfy the customer. Consuming at the rate of 6 c.ft. per hour means 1 c.ft. in ten minutes. If the meter takes eleven minutes to pass 1 c.ft. as shown on the test-dial, it is slow; while if it requires nine minutes, it is fast. This is something that a consumer can understand. The purpose of the burner is simply to consume the gas.

The first meeting of the Midland Junior Gas Association for the 1920-21 session will take place on Thursday, Oct. 21.

Next Saturday there is to be a visit by members of the Midland Section of the Coke-Oven Managers' Association to the coke-oven works at Frodingham of the Redbourn Iron and Coal Company, Ltd.

AN ALABAMA SYNTHETIC AMMONIA PLANT.

War-Time Activities in the United States.

A full description, by Mr. R. S. Tour, of the Haber-Bosch direct synthetic ammonia process appears in the September number of the "Journal of Industrial and Engineering Chemistry;" the writer concluding with the following account of the "United States Nitrate Plant No. 1." constructed during the war at Sheffield (Alabama), generally on the lines of this process.

The American pioneers in the direct synthesis of ammonia on a manufacturing scale were the General Chemical Company. They had been experimenting extensively on catalysts for the ammonia reaction, and had made tentative designs for the construction of a commercial unit, before the United States entered the world war. Pursuant to section 124, "Nitrate Supply," of an Act of Congress, a Committee was appointed to determine the best, cheapest, and most available means for the production of nitrates or other nitrogenous materials. The Committee investigated the direct synthetic ammonia process as it was being developed at that time by the General Chemical Company; and after consultation with the Company, they recommended that the Government negotiate with the General Chemical Company for the right to use its synthetic ammonia process; and that, contingent upon satisfactory results of such negotiations, there be set aside from the $20,000,000 appropriation such a sum, estimated at about $3,000,000, as should be necessary to build a plant to produce by the process about 60,000 lbs. of ammonia per 24-hour day.

In accordance with this, arrangements were finally made whereby "U.S. Nitrate Plant No. 1" was to be constructed to the Company's plans, but at Government expense. The National Defence Act ruled that "the plant or plants provided for under this Act shall be constructed and operated solely by the Government, and not in conjunction with any other industry or enterprise carried on by private capital. Though construction and operation of the plant were by the Ordnance Department, the designs were furnished by the General Chemical Company; and construction as well as initial operation was carried out strictly under the Company's supervision. Deviations in the process, modifications in apparatus, and changes in operating conditions were made only after consultation with, and approval of, the responsible engineers of the General Chemical Company stationed at the plant.

The total cost of "Nitrate Plant No. 1" was about $13,000,000, which covered that of the nitric acid plant, the concentrating plant, the ammonium nitrate plant, and the permanent village for officers and employees. The expenditure was only partly from the funds allotted under the National Defence Act. There is chargeable to synthetic ammonia manufacture only about $7,000,000 of the total. Perhaps an additional $1,000,000 should be charged for completing parts of the plant and installation. Based on the rated capacity of 60,000 lbs. of ammonia daily, the investment would amount to nearly $900 per annual ton of fixed nitrogen capacity.

The ammonia synthesis portions of the plant as installed consisted of three units, entirely independent of each other, not inter-connected, but under one roof. Unit No. 1, the only unit upon which operation was attempted, was rated at 15,000 lbs. of anhydrous ammonia per day. Unit No. 2 was a duplicate of No. 1; while Unit No. 3 was rated at 30,000 lbs. of anhydrous ammonia per day. The total rated daily capacity of the plant was 30 tons of ammonia.

Operation was to be at 100 atmospheres pressure, or somewhat less, with ammonia removed by liquefaction. The raw gas mixture was to be made directly by combined producer and water-gas reactions. The carbon monoxide conversion was at atmospheric pressure, with any necessary additional heat supply to be furnished by superheating the admixed steam, or by a free flame burning in the catalyst chamber. After condensation of the excess steam, compression to 100 atmospheres followed, which pressure was maintained through the rest of the system. The removal of the carbon dioxide was to be accomplished in three stages, in series for the gas, with fresh water being supplied in parallel to each of the stages. The larger part of the carbon monoxide was to be removed by hot caustic solution, and the balance of that impurity by an ammoniacal cuprous carbonate solution. Final drying was accomplished by refrigeration followed by the use of desiccating material. In the circulating system, additional heat was to be supplied to the gases entering the catalyst by a tubular heater similar to a steam superheater, and gas-fired. The catalyst used was especially sensitive, being "composed of iron, sodium, and nitrogen." The ammonia formed was to be removed by liquefaction; refrigeration being supplied by a standard ammonia expansion installation, and the liquefied synthetic ammonia being discharged to storage tanks provided for the purpose.

At the start of operations many difficulties immediately developed, and changes in process and apparatus became necessary. Initial operation of the plant commenced in June, 1918; and the first synthetic ammonia was produced in September. Continuous operation was, however, never actually realized; and the plant was definitely closed in January, 1919, after having produced only a small amount of ammonia. The raw gas manufactured finally developed into a practically straight blue water gas, with most of the nitrogen added later as air for flame combustion in the carbon monoxide converter to maintain temperature there; while the overtaxed and inefficient steam superheaters were discarded. The compressors were quite satisfactory, though under capacity when allowance was made for the hydrogen and nitrogen loss in the water scrubbers, in the inert gas purge, and in unavoidable leakage. The three water scrubbers operating with water in parallel gave much trouble, and were inefficient in scrubbing and in water consumption, which difficulties were obviated by changing to a one-stage scrubbing. The removal of carbon monoxide with hot caustic involved many difficulties, which were overcome only by the elimination of the caustic system with its towers, furnaces, pumps, &c.

All the carbon monoxide was finally delivered to the cuprous solution, for removal there. The cuprous system caused some difficulties; and for improved absorption and efficiency reduced temperatures on both gas and solution were maintained. The purity of gas desired in view of the sensitiveness of the catalyst chosen was never obtained. In the circulating system, the catalysis and heat interchange were not self-maintaining in temperature; and use of the high-pressure heating furnace installed for supplying additional heat was continually necessary, although it could not withstand the service for more than a few days at a time. Under-capacity of the refrigerating installation, excessive friction of gas circulation, and large unaccounted-for gas loss were some of the additional troubles in the circulating system. There were innumerable incidental mechanical difficulties with valves, with joints, with pressure-gauges, and with mechanical labour-saving devices. Experimenting and development stopped in January, 1919; and negotiations looking toward an arrangement whereby the General Chemical Company should continue with the work for the Government were not successful.

As indicated above, many of the difficulties at "U.S. Nitrate Plant No. 1" had been overcome by changes in the process or development of apparatus. Many others can now be overcome in view of past experience; and the balance can be overcome by additional experimenting and development. That final success can be hoped for is evident from the fact that in Germany there are two plants—one at Oppau with 100,000 tons of ammonia annual capacity, and one at Mercersburg with 200,000 tons rated capacity—that were in regular operation during the war. The former was started just before the war, and extensive additions soon followed. The latter was built mainly during the war, and three-fourths of the rated capacity was in operation before the armistice was signed.

The success of the German plants has shown that a process of this type may be successfully operated under war conditions. It has not yet been proved, though it seems probable, that it will be a commercial success under the post-war conditions that have arisen. All reports from Germany point to an optimistic feeling on the part of those connected with the industry there. No doubt the Government have very considerable interest in the German plant, and probably a large amount of the capital cost and all the experimental cost has been written-off as a war expenditure.

Conditions in America are somewhat less favourable for the private operation of a Haber-Bosch plant than in Germany, because of higher labour costs and installation charges. The determining factors may depend on the development of methods of utilization of the ammonia and bye-products, which, in turn, may involve combinations with other known processes. In the German plants the combination of the ammonia-soda with the direct synthetic ammonia process has been accomplished with much success. The combination may be of far-reaching importance in the development of direct synthetic ammonia manufacture. In the United States, during the past year, the Solvay Process Company and the General Chemical Company have together formed the Atmospheric Nitrogen Corporation, with a capital of $5,000,000, for the purpose of developing nitrogen fixation in America. In Great Britain a corporation has been formed in which the Brunner-Mond Company (ammonia-soda process) are financially interested, and which has £5,000,000 capital available to design and develop the direct synthetic ammonia process.

The situation with regard to private operation of a plant in America does not apply to the Government plant at Sheffield (Alabama), built as a war emergency measure. There the United States own a complete plant designed to produce ammonia by a direct synthetic process. It had not reached an operative stage at the close of the war, and considerable alterations will have to be made before it can be considered operative. The Nitrate Division of the Ordnance Department now have under way plans and designs for the modification of "U.S. Nitrate Plant No. 1," to bring the plant into successful operation. This should by all means be done as a military preparedness measure. It will be recalled that Germany did not embark upon the world war until she had two independent nitrogen fixation processes—the cyanamide and the Haber—commercially developed. The United States should not, after the lessons of the war, consent to be in a less favourable position than was Germany six years ago.

Jordan on "Debentures."—When acknowledging in last week's issue the receipt of a copy of the ninth edition of "Debentures; the Purposes they Serve, and How they are Issued," the cost was, by a printer's error, given as 1s. 9d. net. As a matter of fact, the price of the book (which has for its author one so well known in the joint-stock company world as Mr. Herbert W. Jordan) is 1s. 6d. net, or by post 1s. 10d.

DIRECT AMMONIA RECOVERY.

Prof. Cobb's Process.

In the August issue of "The Times" Engineering Supplement there was an article on "Ammonia Recovery in Gas-Works," in which the writer, referring to the recent report of Mr. W. S. Curphey, as Chief Inspector under the Alkali Works Regulation Act, deals with difficulties encountered in connection with "semi-direct" ammonia recovery methods in gas-works. The article concludes with the following remarks upon Prof. Cobb's "direct" process, which is the subject of a patent abstracted in the number of the "JOURNAL" dated Sept. 30, 1913 [p. 939].

Although little information is available on the subject, it is well known that Prof. J. W. Cobb has for some time been experimenting with a direct process which obviates the employment of sulphuric acid. This process has now reached a working scale of a ton of sulphate of ammonia per day. Its operation has been technically successful, and the plant is undergoing modification for the purpose of securing greater commercial efficiency as regards working costs. Briefly described, the process consists in washing the crude gas with a solution of zinc sulphate which, after performing its function, is regenerated for further use. The first reaction, producing sulphate of ammonia and zinc sulphide, is as follows:

$$ZnSO_4+H_2S+2NH_3=(NH_4)_2SO_4+ZnS.$$

The sulphate of ammonia is then filtered out and recovered by evaporation, while the precipitated zinc sulphide is roasted, yielding zinc oxide and sulphur dioxide:

$$2ZnS+3O_2=2ZnO+2SO_2.$$

The roaster gases are finally blown through water containing in suspension the zinc oxide from a previous roasting; zinc sulphate (ready for use again) resulting from the reaction:

$$2SO_2+O_2+2HO_2+2ZnO=2ZnSO_4+2H_2O.$$

One of the merits of the process is that tarry matter in the crude gas does not interfere, as it is destroyed during the operation of roasting.

Prof. Cobb is certainly to be congratulated on having devised a process which is simplicity itself in comparison with methods for arriving at the same ends which have been evolved in Germany. Comparison, for instance, may be made with the latest Feld process, which employs polythionate salts as the purifying medium. Originally Feld employed an iron salt in much the same way as Cobb now uses zinc. But difficulties arose owing to the considerable dissociation of sulphites, and the method was abandoned in favour of one based upon the oxidation of thionates. The crude coal gas is washed with a solution of ammonium tetrathionate, which is converted into ammonium thiosulphate and trithionate. This latter liquor is then treated with a current of sulphur dioxide, when the thiosulphate and trithionate are regenerated into tetrathionate. When the tetrathionate liquor becomes sufficiently concentrated, it is decomposed by heat, with the formation of sulphate of ammonia, free sulphur, and sulphur dioxide. The two last-named are then made use of again in the earlier stages of the process. In spite, however, of the way in which the method has been scientifically perfected, it has, as might be expected, proved too cumbersome in practice.

BYE-PRODUCT RECOVERY PLANT AT CREUSOT.

An illustrated supplement to last Friday's "Engineer" was devoted to describing the Creusot works of Messrs. Schneider & Co., the various undertakings controlled by which firm in France and elsewhere constitute one of the largest groups of mining, metallurgical, and engineering interests in the world. One of the photographs shows the building of a 3000 H.P. blast-furnace gas blowing-engine; and particulars are given of the coke-oven and bye-product recovery plant.

The coke-oven plant at the old works consists of two batteries of 36 and 37 Coppée regenerative bye-product ovens respectively, arranged in a continuous line, and connected with the coal-charging and crushing plant by a system of travelling belts. The crushed coal is carried to a stock tower, which is large enough to ensure a sufficient supply to keep the ovens going for 24 hours, in the event of any stoppage or breakdown occurring in the crushing plant. The double battery of crushers has been installed between the two coke-oven batteries, and is fed by conveyors which collect the coal from the coal stock tower and convey it to the boxes of the two electrically driven coal chargers. Two electrical coke-pushers push the coke out on to an incline sloping at an angle of 30°, whence it travels on an endless belt, which, after screening off the fine, delivers the coke into the coke-tubs for hoisting to the blast-furnace charging platform.

As to the bye-product recovery plant, when working on a normal coal approximately 300 c.m. of gas are obtained per ton of coal. After the ammonia, tar, and benzole have been extracted, 60 p.ct. of the gas is used for heating the ovens themselves, a further 10 p.ct. for heating the boilers of the bye-product recovery plant, and the remaining 30 p.ct. to enrich the producer gas used in the open-hearth furnaces. The minimum calorific value of the coke-oven gases is 3700 calories per cubic metre.

The sulphate plant consists of three distillation towers for the ammoniacal liquor, two sulphuric acid saturators, and two centrifugalizers for drying the recovered sulphate of ammonia. The yield of sulphate per ton of coal is about 24 lbs.

The benzole recovery plant comprises a battery of Mallet oil towers for the separation of the tar oils and the crude benzole, and continuous stills for the fractional distillation and rectification and chemical washing of the latter. The commercial grades made here comprise: 90 p.ct. benzole spirit for use in motor cars; pure crystallized benzene for use in pharmacy, perfumery, and dye industries; pure toluene for pharmaceutical purposes and for explosives; 50 p.ct. benzole spirit and "benzole solvent" of higher boiling points for india-rubber solvent and for cleaning purposes; and "Excise" benzene, heavy distillate evolved between 150° and 200° C., and used to denaturalize commercial alcohol.

From the heavy oils that remain after the final separation of the "Excise" benzene, a valuable artificial resin, "Coumarone," separates on treating the mother liquors with sulphuric acid. This resin can be used for a variety of purposes, as it is a good non-conductor. It is used as a binder for coal briquettes, and in the manufacture and repair of furnace electrodes. It softens at 50° and melts at 55° C. It is odourless and tasteless, and is useful as a menstruum for pigments and as a substitute for varnish bodies, though its brown colour impairs its application for delicate colours. Investigations are proceeding with the object of finding a method of decolorizing it, and making it more generally useful for these purposes.

The residual heavy oils are used either in Diesel engines or for direct combustion under boilers, or for washing the coke-oven gases for benzole recovery. A proportion of the residual oils are, after further cleaning, employed for lubrication. The pitch is used for briquetting coal, for making electrodes, and for mixing basic material.

The tar from the coke-ovens and from the gas-works is treated in two large coal-fired boilers. The anthracene is pressed in bags to remove the oil, and sold to dye-works. At present, however, the rectification is not pushed as far as the direct production of anthracene; the naphthalene residues being used as a fuel in the works. Its cost makes it, value for value, cheaper than coal; while its calorific power and freedom from sulphur and ash render it an ideal fuel in these circumstances. The calorific value is equal to two-and-a-half times its weight of coal. The yield of this material—centrifugalized naphthalene—per ton of tar is 124 lbs.

Advantages of Gas Industrially.

Summing up the reasons which go to make gas the best industrial fuel, the Chicago Flexible Shaft Company say that the use of coal or coke as a fuel made necessary the employment of an enclosed muffle to keep sulphur and soot and injurious fumes and gases away from the metal. With gas, a clean, quick, hot, non-oxidizing flame is secured, which permits the use of a relatively open heating chamber in which free circulation of the hot gases ensures a high and uniform heat with a minimum of fuel. Gas-furnaces deliver a daily output of work from 50 to 300 p.ct. greater than coal or coke. With the flexible control of temperatures, the work is better done. It is also better because of the chemical purity of the heated atmosphere inside the furnace. Gas-furnaces can be brought to operating temperature more quickly than others; while oxidation losses and complications are practically eliminated. Brickwork lasts very much longer, because of the avoidance of extremes of temperature, and the absence of those chemical impurities in hard fuels that attack the silica linings. The work lies on a clean bottom slab, always in full sight; and it is evenly heated on all sides. No attention to fires is necessary, other than a slight opening or closing of valves; and the heat is more uniform. While gas and oil fuel have marked advantages for all kinds of work, their economy and efficiency are perhaps most striking in continuous work—like rivet heating, bolt heading, and similar kinds of uninterrupted quantity production, because the supply of heated metal is always adequate to demands.

Brayshaw Patent Gas-Flow Indicator.—In connection with the excellent working display of gas-furnaces made by Brayshaw Furnaces and Tools, Ltd., of Manchester, at the Machine Tool Exhibition in Olympia, attention is attracted by the patent gas-flow indicator, a small instrument, by the aid of which (as was pointed out when noticing the exhibits a fortnight ago), the amount of gas flowing through a pipe at any given time is indicated upon a dial in terms of cubic feet per hour—thus enabling the gas consumption to be ascertained without the necessity of taking a meter reading. The apparatus consists of a "throat" which is coupled into the pipe-line (either vertical or horizontal), and a gauge which may be attached to it, or, if preferred, may be placed a considerable distance away. Connection between the throat and gauge is made by two small pipes—rubber being used for short lengths, and metallic tubing for long distances. By means of the indicator, the consumption of any single unit may be observed without effort; and abnormal fluctuations may be checked immediately they occur. It has been specially designed for dealing with pressures at which town gas is commonly supplied; and it offers very useful assistance in maintaining desirable regularity in gas consumption.

ECONOMIC SELECTION OF COAL.

Among the papers presented this week at the autumn meeting of the Iron and Steel Institute was one by Mr. A. L. BOOTH, of Manchester, on the "Economic Selection of Coal"—written with the object of showing how microscopic work, used in conjunction with chemical analysis, can be of help in the most economical selection of coal for gas production, boiler-firing, coke manufacture, or other purposes.

The method usually adopted, said the author, is to make a proximate analysis (at the best very unsatisfactory, and really of little use), collate the results with practical experience, and make a trial on some particular plant. Only too often it proves to be unsatisfactory. The trouble arises from the fact that two coals can have practically the same appearance, give the same analysis, and yet be totally different in behaviour. This frequently occurs, and does not seem to be realized by fuel users generally.

To be in a position to select coal, an idea of its mode of formation is essential. The coal in the principal British seams may broadly be taken as being composed somewhat as follows: At the bottom occur leaves, small stems, broken-down wood tissue, &c., from ferns, horsetails, and cordiates; and above the main bulk of the coal made-up of the remains of Lycopods, which include the great Lepidodendrons, Sigillarias, &c., the spore-bearing trees, and above these again the cannels, which are a class apart.

The coal falls, therefore, into three main types: (*a*) "Humic," composed of leaves, stems, and broken-down woody tissue, together with some spores; (*b*) "Spore" coals, in which both "Micro" and "Mega" spores predominate; and (*c*) "Cannel" coals. The spores are the reproductive organs of the plants, and correspond with the pollen and ovules in present-day flowering plants. In some cases the two kinds were born in one cone; in others, in separate cones. The "Micro" spores are very small, while some of the "Mega" spores are about $\frac{1}{8}$ in. diameter. The "Cannel" coals contain small round yellow bodies. It has been suggested that this coal has been formed under water, and that the yellow bodies are algæ or microscopical animal life. The author, however, thinks this is open to question. In any case, much work remains to be done before definite conclusions can be drawn. The arrangement outlined above varies in different places. In Lancashire, for instance, a great proportion of the coal is soft—that is Humic; while often there is a layer of Humic coal above the Spore coal. It will, of course, be realized that these three classes run one into another; and Humic coals occur containing more and more spores, while Spore coals become more and more "cannellized" as the yellow bodies merge with the spores. This is where microscopic work is necessary to enable one to judge, from experience and comparison with other coals, what a particular sample can be used for.

In classifying coal from a chemical standpoint, several methods are open; but the two most in favour among the many workers on coal are: (*a*) In respect to the relation between the carbon and the hydrogen; (*b*) in respect to the relation between the carbon and the oxygen. Both methods are open to objection. Humic coal, for instance, being derived from leaves, stems, &c., composed largely of cellulose and ligno-cellulose, would be subject to bacterial action, and during decay would lose carbon, hydrogen, and oxygen as methane, nitrogen, and water. This decay would not always be the same; and since the miscroscope shows organized plant remains, it is fairly safe to assume that some cellulose or ligno-cellulose still remains in coal with but little alteration. In point of fact, it is possible to dissolve out a little cellulose with suitable solvents. If cellulose is present, even a small proportion with its high oxygen and hydrogen content will have a very marked influence on the hydrogen and oxygen content of the coal. This, together with varying amounts of "resinic matter" (the term is used with due reserve), may effect comparatively large variations in the proportions of carbon to the hydrogen and oxygen in exactly the same class of coal. It was the unsatisfactory nature of the chemical classification which led to the microscope being used in selecting some 250,000 tons of coal per year for different purposes.

The method adopted may be of interest. Sections were cut of a large number of typical pieces of coal from different sources. Some had been proved over a period of years to be satisfactory for a particular class of work, while others had proved unsatisfactory for the same class of work. All were carefully examined under the microscope. It was soon seen that there were three main types, and that each type was suitable for certain classes of work. Further work along the same lines enabled one to judge how far from the typical member it was possible to go without getting into difficulties. [Coloured photomicrographs accompanying the paper showed thin sections of coal from typical specimens of the three types.] The method of cutting sections is similar to that used in making rock sections; but is infinitely more difficult, and requires much patience. A piece of coal is selected; and if soft and cracked, it is treated with a transparent, colourless binder. One side of the coal is then ground down, using carborundum powders of finer and finer grade, finishing off with a Water of Ayr stone. The result should be a smooth flat face. The coal is then mounted in Canada balsam on a piece of glass; the face being pressed well against the glass. When the balsam is set, a slice of coal is cut off and ground down until thin enough to transmit light.

When a coal from a different source had to be used, sections were cut; and it was thought reasonable enough to expect that it would be suitable for the same purpose as a known coal of similar structure. This has been borne-out in actual practice. The microscopic observations are considered along with the chemical. To help one to decide whether or not a coal will be satisfactory, the following chemical analyses are required:

1.—A proximate analysis. An ultimate is not really necessary, but it is for subsequent plant efficiency calculations.

2.—The percentage of total sulphur.

3.—The percentage of sulphur in the ash. This is necessary to get the amount of sulphur which will be carried away in the products.

4.—An analysis of the ash itself. This is necessary to form some idea of the tendency to form clinker.

Determinations of the fusion-point of the ash can be made; but the presence or absence of steam, the size of the coal, &c., may influence the fusion-point to such an extent that it is doubtful whether a laboratory determination is of much value. A bomb determination of the calorific value, together with the amount of ash, gives a basis on which to work out the actual cost of the coal. Percentages of nitrogen and chlorine are required in coals for a recovery plant, though a high chlorine content is detrimental to fire-brick, and the formation of ammonium chloride, with subsequent hydrolysis, has a very marked effect on any ironwork with which it comes into contact. For powdered coal firing, the percentage of phosphorus will often be necessary.

The microscope not only helps in the selection of coals, but in some cases is of use in deciding whether or not it would pay to wash them, and will explain why an apparently good, clean coal has, for instance, a high ash content. Washing may be quite useless in such a case. If any headway should be made in the use of "powdered coal," the question of spontaneous combustion will have to be considered; and, as Lomax has shown, coals which are liable to spontaneous ignition can be detected by the microscope.

In the event of a shortage of a particular class of fuel, the more detailed knowledge of coal which the micro-study gives, enables the best substitutes to be used. To obtain satisfactory working with the substitute, any necessary alteration in the running of a plant can be made without waiting for adverse effects to develop. Such a detailed examination of coal is, perhaps, beyond any but the large consumer; but a group of firms or collieries combining together could do much. Perhaps, one day it will be possible to buy coal to specification, as we now buy steel.

To anticipate possible doubts it might be stated that coal from the same seam is generally very uniform. Sections cut from the same seam, but delivered on dates twelve years apart, show that the coal is of the same type.

Coke-Oven Gas and Flat-Flame Burners.

In order to make full use of a supply which is available of coke-oven gas from the Maryland plant of the Bethlehem Steel Company, the Consolidated Gas Company of Baltimore petitioned the Public Service Commission of Maryland for an order temporarily reducing the fixed heating value standard of 550 B.Th.U. to 500 B.Th.U. This order was granted until October, with certain conditions regarding rates; and the Company are now asking for the lower figure to be made the permanent heating standard. It seems that the coke-oven gas supply is sufficiently large to meet completely the summer demands of the Company, and to assist materially in filling the winter requirements. There are, however, a relatively small number of the Company's customers who still use flat-flame burners; and from these burners practically no illumination can be obtained with the coke-oven gas delivered in Baltimore. A special campaign was therefore undertaken with the object of replacing by Welsbach "Thrift" incandescent lights such flat-flame burners as remained. It is pointed out that the feature which made these lights particularly adaptable in this emergency was the fact that they could be installed in old globes and fixtures. Under the present conditions obtaining in Baltimore, they consume approximately $2\frac{1}{2}$ c.ft. of gas per hour, and give an illumination equal, if not superior, to that possible with a flat-flame burner consuming 5 c.ft. per hour under the conditions prevailing in Baltimore when 20 c.p. gas was supplied. There are 146,000 gas consumers in the city; and during the first forty days of the campaign the total sales of "Thrift" lights amounted to 64,392. The latest figures show that over 100,000 of the lights have been sold. The Company adopted the policy of selling them without profit, and offering to instal them without charge.

Substitutes for Coal in Gas Making.—The results of using lignite, peat, wood, and oil shale as substitutes for gas coal in Bavaria have been chronicled by Herr P. Schumann in the "Journal für Gasbeleuchtung." In all cases some defects were found; and figures quoted show that in no case was the coke yielded satisfactory. One trouble experienced was the large proportion of carbon dioxide and moisture in the gas, which caused the removal of carbon deposits from the retort material, and consequent loss by leakage. With all the materials the cost per unit of heat was high when compared with gas coal; the highest being wood, with which the cost was just four times as much as with the coal named.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The "Betrayal" of the Gas Shareholder.

SIR,—Your correspondent "One of the Betrayed" says he and his various relations have been gas shareholders for twenty years. Up to the outbreak of war, therefore, he and his relatives had had fourteen years' experience of this class of investment—long enough to decide whether it was worth holding, and during which to have acquired some knowledge of the sliding-scale regulations pertaining thereto. War broke out, and those regulations which had given a certain security to the investments in question failed of their purpose, with resultant hardships. The industry combined and fought for their alleviation, with results which are common knowledge. Recently a Public Bill became law providing, *inter alia*, machinery for a return to pre-war conditions as regards dividends.

The railways were taken over by the State with nothing more than a guarantee of pre-war dividends—a basis since adopted in the case of other undertakings which were not under Governmental control. The arrangements have been parliamentary ones, and not made by the Government Departments referred to by your correspondent. I sympathize with him in that a post-war settlement on a pre-war basis is a hardship, to say the least of it. But Parliament was appealed to, and Parliament has spoken.

Your editorial comments leave little in addition for my reply, except in one particular where your correspondent refers to what he considers the practical failure of co-partnership. For thirty years under co-partnership principles this Company have not had a strike, nor the semblance of one, which is more than can be said for the great bulk of those undertakings in which your correspondent apparently regrets he did not invest his money, and thus make profit out of the war.

CHARLES CARPENTER.

South Metropolitan Gas Company, Sept. 20, 1920.

Not Betrayed.

SIR,—May I be allowed to make a few remarks in reply to the letter, signed "One of the Betrayed," appearing in the "JOURNAL" of Sept. 15?

Before the war, the ordinary shareholder in the South Metropolitan Gas Company was receiving £5 4s. p.ct.; and the price of his stock stood at £111 13s.—the yield being less than 5 p.ct. Under the sliding scale, the dividend on the stock was liable to rise or fall as the price of gas rose or fell above or below the standard price. Under the South Metropolitan Gas Act of this year, whatever the price charged, the dividend cannot fall below 5 p.ct.; and should the profits exceed 5 p.ct. the excess is to be divided, as to 75 p.ct. to the public (by a reduction in price), as to 12½ p.ct. to the workmen, and the remaining 12½ p.ct. to the shareholders. Surely this is a far better arrangement for the shareholders than the old sliding-scale?

Your correspondent asks why his dividend should be limited to 5 p.ct. while the new shareholders are to get 6 p.ct. His "minimum" dividend is limited to 5 p.ct., and the reason why the minimum dividend on the new capital is fixed at 6 p.ct. is that the cost of raising new capital would have been almost prohibitive had the minimum dividend been fixed at less than 6 p.ct., and the old shareholders would have been the sufferers.

When money is again at (say) a 4 p.ct. price, the old shareholder will find his stock at round about £120, instead of at about par, as in pre-war times, as the 5 p.ct. minimum dividend is, in effect, guaranteed.

Your correspondent goes on to say that "time has proved co-partnership to be a practical failure." I submit he is entirely wrong, and that, on the contrary, time has proved that co-partnership between the shareholder, the workman, and the public is going to be the saving of public utility companies, and those industrial companies to which it may be possible to apply it.

Dr. Carpenter and those associated with him are men of proved ability, and do not require anybody to defend them. But if "One of the Betrayed" really has a large interest as a gas shareholder, it is a pity he does not accept accomplished facts, instead of writing to the press and possibly frightening ignorant people. The time for objection was last December, when the South Metropolitan Company's Bill was deposited. Surely those of us who are really interested in the gas industry should refrain from doing or saying anything, however trifling, which may depreciate our property before the public, and render it more difficult and expensive to raise the new capital which is of such vital importance.

That Parliament has during the war treated gas shareholders most unfairly—I would even go so far as to say has deliberately robbed them—is, I am sure, the unanimous opinion; and the only way to get better treatment has been to convince Parliament that the public interest would suffer unless it was granted.

E. B. READ.

Temple Chambers, Temple Avenue, E.C., Sept. 17, 1920.

[A reference to this letter appears on an earlier page in this issue.—ED. "G. J."]

Mr. Harry Jones and the Thermal Efficiency Controversy.

SIR,—In reply to Mr. Harry Jones on the above subject, I may say that I fully appreciate the good spirit in which he writes. It comes as no surprise to me that he is "fed up" with the controversy. I am more than "fed up." To some people white is white and black is black; and I am afraid I do not possess the same generous toleration which comes so easy to Mr. Jones.

When a Fellow of the Royal Society as well as the President of the Institution of Gas Engineers joins issue with the whole industry on such an important matter as these efficiencies, every opportunity should be given to him to make his case good. I have done my best to give Sir Dugald Clerk a fair run; and to me, and I believe to the whole of the men in the industry who are conversant with the subject, he has failed in any particular to substantiate the thermal efficiencies of gas and electricity as published in his report. Sir Dugald Clerk is not disposed to acknowledge this failure. Of course, I bear him no personal animosity.

Mr. Jones says that Sir Dugald and I simply argue from different points of view, "which we all understand." I do not doubt that all understand who, like Mr. Jones, take the pains to understand. But, unfortunately, it sometimes requires an earthquake to get the "follow my leader type" to look into things for themselves. Having indicated and shown the importance of taking what I consider is the right point of view, I am now content to leave every man, as Mr. Harry Jones suggests, to form his own opinion.

GEO. HELPS.

Nuneaton, Sept. 17, 1920.

P.S.—I was away on my holidays when Mr. Jones's letter was published; hence this delay.

Thermal Efficiency—A Personal Note.

SIR,—In reply to the letter of the 8th inst. from Mr. Isaac Carr I beg to make the following remarks:

1. Mr. Harry Jones has not referred to the matter of the "challenge." It is Sir Dugald Clerk who seeks to have the honour of standing by Mr. Carr.

2. After the second paragraph of Mr. Carr's letter, it will be no surprise if this gentleman seeks holy orders.

3. The extract given in paragraph 3 does not cover the case. The whole correspondence was published at the time in your pages, as well as in the other technical gas papers. I call particular attention to my letter to Mr. Carr of Jan. 11, 1919, as to the causes of the tests falling through.

4. Are we to understand that Mr. Isaac Carr's view, even now, is that 350 B.Th.U. gas has no advantage over 500 B.Th.U. gas when the latter is supplied, as it has been supplied for the greater part of the last (say) twenty years, and used in ordinary gas boiling or cooking rings?

5. I believe that Mr. Isaac Carr gave evidence in the Brighton case—that it would have been better for the consumer if gas of 500 B.Th.U. or so had been supplied, and the pressures considerably reduced, rather than supply a gas so low as 350 B.Th.U. Does he still hold this view?

Finally, I would remind Mr. Isaac Carr that personal abuse from some quarters is praise indeed!

GEO. HELPS.

Nuneaton, Sept. 17, 1920.

REGISTER OF PATENTS.

Producing Water Gas and Carbonizing Coal.

No. 132,488.

DOHERTY, H. L., of New York City.

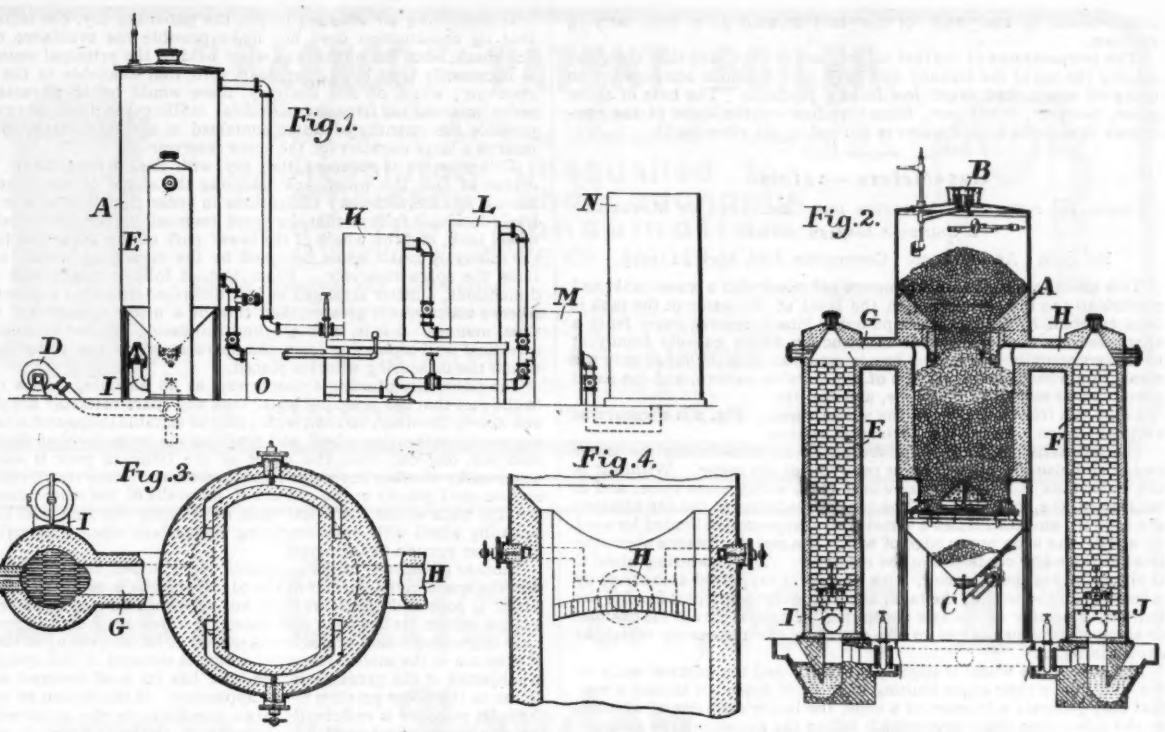
No. 11,773; May 10, 1919. Convention date, Sept. 7, 1918.

The primary object of this invention is to provide a process for making water gas by which a minimum amount of heat is removed by the products issuing from the apparatus in which the process is carried out. Another object is to provide a process of producing gas from coal in which a hot mid-zone may be maintained in a fuel column by means of an intermittent air cross blast while preventing tar from reaching the hot mid-zone. A still further object is to provide apparatus in which gas may be efficiently produced and coal effectively carbonized while producing gas.

Fig. 1 [p. 623] is a side elevation of the gas-producing furnace and its auxiliary gas-treating apparatus. Fig. 2 is a vertical section of the furnace. Fig. 3 is a horizontal section of the furnace—one of the heat regenerators being broken away. Fig. 4 is a detail view showing the upper portion of the refractory lining of the furnace.

Fuel is passed in a column downwardly through a shaft furnace A—being intermittently admitted through the charging opening B and intermittently discharged through an outlet gate C. Gas is produced from the fuel in two distinct operations—namely a blowing or heating operation and a gas-making operation. In the blowing operation, air is blasted through the fuel column by a blower D. The air passes into the base of one of a pair of regenerators E or F; flows up through the regenerator; and then passes through a horizontal flue G or H into the mid-portion of the fuel column. The blast exhaust gases pass out of the fuel column very hot, and flow through one of the flues into one of the heat regenerators, where the heat is absorbed from the gases and the gases exhaust comparatively cool through outlet pipes I or J. When the heat of the exhaust gases has built-up the temperature of one regenerator, the incoming air from the blower is reversed by valves to admit the air through the heated regenerator and exhaust the air through the regenerator previously used for preheating the air. The fuel column is blown intermittently, and the direction of the blasting gas is generally reversed in successive blowing operations. In the gas-making operation, the air-blast is cut off; the regenerator exhaust pipes are closed; and a heat-transferring gas (generally a combustible gas, together with steam) is led into the furnace through an inlet near the bottom of the fuel column, and passes upwardly through it, countercurrent to the movement of fuel. The gas enters the column in a comparatively cool condition, absorbs heat from the coke in the lower portion, and carries it towards the hot mid-portion.

After the gas passes through the hot mid-portion, it imparts heat to the fuel in the upper portion and leaves the column in a comparatively cool state. By means of the intermittent cross blast and the intermittent circulation of gas upwardly through the fuel column, four distinct



Doherty's Water-Gas and Auxiliary Coal Carbonizing Plant.

zones are maintained in a column of fuel containing coal—viz., (1) the hot mid-zone or combustion zone through which the cross blast is driven, (2) a relatively hot coal-carbonizing zone immediately above the combustion zone, (3) a coal-distilling and tar-condensing zone at the upper end of the column, and (4) a coke-cooling zone extending from the combustion zone to the bottom of the column. By a careful regulation of the cross blast air, the heat-transferring gas, and the passage of the fuel downwardly through the furnace, the temperature in the fuel column may be controlled so that the fuel will enter and leave it in a comparatively cool state. The gases passing upwardly through the fuel column enter and leave the fuel column in a comparatively cool state, and the cross blast air enters and leaves the heat regenerators in a comparatively cool state. In these operations, therefore, heat is always carried towards the hot mid-portion of the fuel column; the heat being recuperated from the products removed from the furnace, and utilized in the carbonization of coal and the production of gas.

The gases produced from the fuel and steam, together with the heat-transferring gas which may pass through the fuel column, are removed from the upper end of the furnace into a main and pass into a water condenser K, whence they pass into a scrubber L, then into a purifier M and into a gasholder N. A portion of the gas advancing to the holder passes through a valve and is forced by a blower through a water-absorber O. The water used in this absorber consists of that which has been previously heated in the condenser K and flows from it into the upper portion of the absorber. The increased temperature of the water over that of the incoming gas increases the temperature of the gas and results in a large amount of water vapour being carried out with the gas. The gas-water-vapour mixture from O passes into a conduit connected to the furnace-gas inlet.

The furnace is arranged to support the fuel in a vertical column in such a manner that the fuel may be continuously advanced through it, while gas is being intermittently produced and coal in the fuel is being carbonized. The furnace consists of a cylindrical gas-tight metal shell provided with a refractory lining and having a top cover in which is the charging opening and a coke-discharging hopper at its lower end. The refractory lining is only in the central portion of the inner surface of the shell, so that the upper and lower ends of the fuel column normally project beyond the lining. The lining is supported at its lower end upon a plate mounted upon the upper ends of the columns which support the metal shell. The upper end of the lining is constructed to form a restricted opening for the passage of fuel through the coal carbonizing zone; and the restricted passage extends down to the upper end of the hot combustion zone. Below this the lining conforms to the shape of the shell, so as to increase the cross-sectional area of the fuel column, in order that the coal may expand and be in an open condition to assist the cross blast in penetrating through the column. Fire arches are arranged to form the lower portion of each side of the restricted passage immediately in front of the blast air flues G, H, and serve to direct the blast downwardly into the hot mid-zone. These fire arches confine the cross blast to the mid-zone and prevent a direct application of the cross blast into the coal carbonizing zone, so that the temperature of this zone may be accurately controlled.

The fuel here consists mainly of coke; and when the blast gases pass through the mid-zone, the coke is burned to produce carbon dioxide. The temperature of the coke in the mid-zone is very high, and the fuel bed usually has such a thickness that the differential pressures which may be practically used for driving the blast air will not entirely prevent the formation of some carbon monoxide by the decomposition of carbon dioxide within the fuel bed. This carbon monoxide, therefore, will pass out through one of the flues G, H, or into the corresponding regenerator. To ensure that all the heat in the exhaust gases leaving the fuel bed (heat of combustion as well as sensible heat) may be removed in the regenerators E and F, sufficient secondary air is led around the fuel column to burn the carbon monoxide carried out of the fuel column with the blast gases. The secondary air is conducted through passages formed in the refractory lining.

The furnace illustrated is said to be well adapted to be used in conjunction with a coal carbonizing furnace, used for producing coke; while the coke would be used for making water gas. If the fuel column consists entirely of coke, only three distinct zones would be maintained in the fuel column—namely, (1) the hot mid-zone through which the cross blast is forced, (2) the coke-cooling zone extending from the hot mid-zone to the bottom of the column, and (3) a coke-preheating zone extending from the hot mid-zone to the top of the column. Steam alone would be used as the heat-transferring medium for making gas from the coke-fuel column; but it is preferable to use a mixture of water gas or other combustible gas and water vapours absorbed in the gas, since the gas acts as a carrying medium for introducing the water vapours into the fuel column without the necessity of heating water sufficiently high to generate steam. Further, the gas of the mixture would act as a heat-transferring medium for maintaining the distinct zones in the coke column and reducing the partial pressures at which the formation of gas takes place.

If coke is not accessible for running the furnace, it may be used for carbonizing coal and producing water gas. When coal is carbonized in the furnace, coal (or a mixture of coal with coke—the mixture depending upon the amount of volatile material in the coal) is charged into the furnace, and the four distinct zones above referred to are maintained in the fuel column. During the gas-making operation, the air blast fan D is shut off, the exhaust pipes I and J are closed, and the heat-transferring gas, consisting of steam or a mixture of gas with water vapour, is circulated up through the fuel column. During the first part of the blasting operation, the heat-transferring gas is circulated up through the fuel column with sufficient velocity to hold the oils or tars condensed in the coal-distilling zone from running back into the coal carbonizing zone. When the air-blast is built-up to full pressure, the heat-transferring gas-circuit is cut off, and sufficient back-pressure is placed on the exhaust pipe I or J to force a portion of the blasting gas upwardly through the fuel column and so prevent the tar or oil in the column from running down into the coal carbonizing zone. When the temperature of the hot mid-zone has been built-up sufficiently for making gas, the heat-transferring gas is circulated up through the fuel column before the air-blast is entirely cut off. In this way, gas is always being circulated up through the fuel column above the hot mid-zone to prevent tar or oil from running down into the coal carbonizing zone.

When carbonizing coal and producing gas, the temperature of the mid-zone is maintained sufficiently high to decompose the steam, and the temperature of the coal carbonizing zone is maintained sufficiently high to decompose the pitch distilled from the coal, so that practically all the heavy tars and pitch, which condense in the coal-distilling zone and run back into the coal carbonizing zone, are broken-up into fixed gases and free carbon.

The heat-transferring gas used when carbonizing coal preferably consists of a mixture of water vapour and water gas, or any other combustible gas which will not be decomposed in passing through the hot mid-zone. In this way, the water gas acts as a carrying medium to introduce the vapour into the fuel bed for making water gas, and a very large amount of coal can be carbonized for producing coke. If the water gas produced in the operation, however, contains coal-distillation products which will be decomposed by passing them through the hot mid-zone, it may be desirable, the inventor states, to introduce

steam alone at the base of the fuel column as a heat-carrying medium.

The temperatures of the fuel column are so regulated that the gases leaving the top of the furnace will have only sufficient temperature to carry off steam and other low-boiling products. The heat of these gases, however, is not lost, since they heat-up the water of the condenser K and the heated water is utilized in the absorber O.

Gas-Meters.—141,696.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATERIEL D'USINES A GAZ, of Paris.

No. 9999; April 9, 1920. Convention date, April 12, 1919.

This invention relates to gas-meters provided with a water-tank, and particularly to the type in which the level of the water in the tank is kept constant by automatically pumping into it reserve water from a spare reservoir. The mode of construction differs entirely from that of meters actually in use, and has in common with the latter only the measuring wheel, which may be of any suitable pattern, and the usual parts—water inlet, overflow tube, and the like.

Fig. 1 is a front elevation of the whole meter. Fig. 2 is a transverse vertical section. Fig. 3 is a horizontal section.

The apparatus consists in a receptacle A, constituting the lower casing and also the reserve water reservoir of the meter. Within it is the water-tank B, or measuring wheel tank, which rests upon, and is secured to, the bottom of A. The tank spreads out at the top towards the syphon, and constitutes a vessel with a large section limited forward by a wall, the wide upper edge of which is a certain distance above the level of the water contained in the reservoir. The measuring wheel C is placed within the reservoir, with its axle D supported at the back by a bearing on the wall of the tank, and at the front by a part fixed to the bottom—a portion of the axle occupying the central part of the channel or syphon bringing the gas to the centre of the measuring wheel, as shown in fig. 2.

The axle of the wheel is slightly inclined; and the internal walls of the wheel have their edges limiting the central space cut in such a way that they generate a frustum of a cone, the larger diameter of which is on the side where the syphon which brings the gas within the measuring wheel enters the central space. The upper generating line of this frustum, being horizontal the height of the water-seal, is the same on the whole depth of the wheel; and the diameter of the central aperture of the wheel being appreciably greater at the entrance of the syphon than on the opposite side, there remains round the syphon sufficient space to allow the water to fill the compartments or to escape from them during the working of the apparatus as freely as through the part of the central opening not occupied by the syphon.

At the end of the axle is a worm G gearing with the helical wheel H solid with the vertical axle I of the registering mechanism. A bevel pinion J, fixed on the lower end of the vertical axis, operates the device which raises the water from the reserve water reservoir and pours it on the wheel tank by means of a second bevel pinion K, keyed on an axle L placed under the centre of the measuring wheel.

Finally, the whole meter is completed by a cover N, which supports the registering mechanism and the various accessories—water inlet, overflow tube, and the like. It is provided with a projecting part having the shape of a gutter facing the plug O, which closes the aperture of the overflow and causes the water to flow clear of the wall into a suitable vessel.

From what has been stated, the inventors claim that it will be understood that meters constructed according to this invention present numerous advantages over meters in actual use: The wheel tank and the casing formed by the lower receptacle and the cover, which can be stamped or cast with all the holes, bosses, or walls required, constitute simple receptacles of easy manufacture which can be put together or taken to pieces almost instantly without touching the essential parts, which are thus always in adjustment. The delicate portion of the meter is therefore reduced only to the measuring wheel, and to the parts required for registering the volume supplied, and to maintain the water level if the meter is of the constant-level type. The putting together of the meter, therefore, instead of being an assembling of numerous pieces difficult to put in place within a cylinder, does not require skilful handling.

The construction just described has also the advantage of allowing the greatest utilization of a large portion of its internal capacity as a spare reservoir. The usual construction of meters only allows a relatively small volume for the spare reservoir—the greatest portion of their cylindrical casing being occupied by the water-tank itself; the other portion, of much less capacity and generally placed in front of he apparatus, being alone adapted for the reserve water.

In examining an ordinary meter, the patentees say, one recognizes that its construction does not make possible the avoidance of this drawback, since the quantity of water held by the principal water-tank is necessarily very large compared with that available in the spare reservoir; while, on the contrary, there would be an advantage (in order to avoid too frequent periodical refillings) to limit as much as possible the quantity of water contained in the water-tank, so as to reserve a large capacity for the spare reservoir.

This criterion is obtained, they say, with their arrangement. As a matter of fact, the water-tank adopting the shape of the wheel and having just the necessary dimensions in order that it is able to move freely inside, it follows that the spare reservoir surrounds entirely the wheel tank, and the whole of the lower part of the apparatus (except the relatively small space occupied by the measuring wheel) constitutes the spare reservoir. From this, it follows that, with equal dimensions, a meter arranged as just described contains a quantity of reserve water much greater than that of a meter constructed in the usual manner—that is, with a cylindrical casing divided internally by a vertical wall separating from the spare reservoir the water-tank in which the measuring wheel is placed.

The possibility of using a simple ring as an elevating device is due to the fact that the principal water-tank and spare reservoir are placed one above the other, so that, with a ring of suitable shape and size resting on the measuring wheel and reaching the lower level of the spare reservoir, one can raise the water of the latter to pour it into the water-tank, whether the water remains attached to the ring by surface tension until gravity or the contact of the walls of the wheel compels it to fall back within the wheel tank, or whether the ring acts like an elevating wheel with cups emptying themselves when they arrive to the upper portion of their path.

Another advantage of the apparatus, it is claimed, resides in the fact that the space in the portion of the cover which is over the syphon and which is constantly filled with gas not yet measured can be made with a large section (as has been said before) is important from the point of view of the exactitude of the measurement. In fact, owing to the loss of pressure in the meter, the water which is situated in this space and is subjected to the pressure of the inlet has its level lowered and is driven in the other portions of the apparatus. If the section on which the inlet pressure is sufficiently large, this prevents the occurrence in the measuring wheel itself of a lowering of the level which is apt to render the measuring defective. The internal space which is subjected to the inlet pressure plays therefore the part of a level compensator, contributing to the exactitude of the measurement whatever may be the loss of pressure in the measuring wheel.

It must also be noticed that the walls of the measuring wheel tank being very close to the wheel, the variations of level due to variations in the loss of pressure are much more delicate in the space included between the wheel and the neighbouring walls of the tank than in the corresponding space of meters the wheel tank of which does not follow closely the shape of the wheel.

Concerning this point, it is an evident advantage from the point of view of exact measurement if, in case of a variation in the loss of pressure, the corresponding variation of level should specially take place in the parts which are submitted to the outlet pressure—such as the space external to the wheel; and that this variation should be little pronounced in the other parts subjected to the inlet pressure.

The joint of the two pieces constituting the casing has been purposely brought down below the upper level of the water in the space reservoir in order that no escape of gas may take place when putting the meter in operation, should the joint be badly made. Owing to the position of the joint, there cannot be then any escape of gas; but a leak of water takes place which indicates the necessity of attending to the joint.

The internal space of the casing above the water and the measuring wheel contains only gas which has been measured; so that any fraudulent attempt to obtain non-measured gas by piercing the external walls or taking out the plugs of the opening for the introduction or abstraction of water would remain without result.

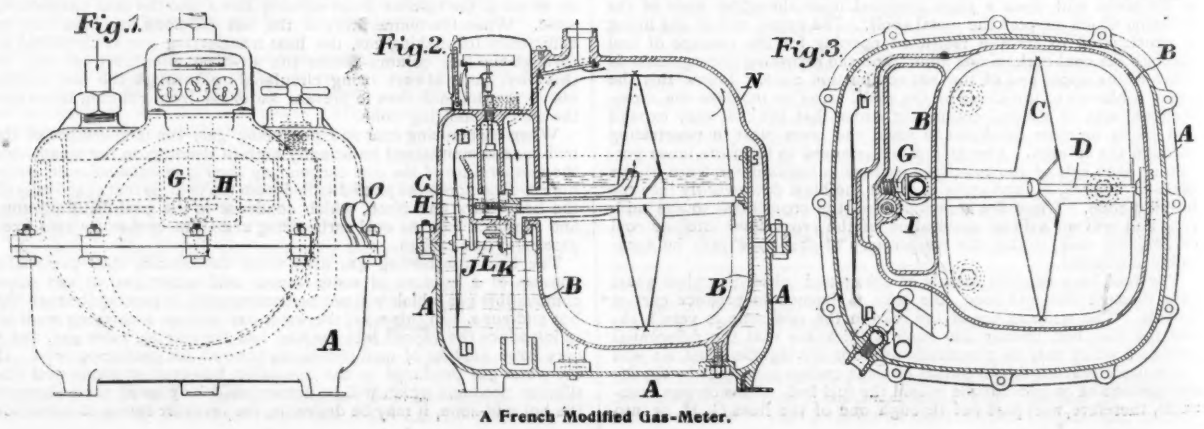
The features mentioned are independent of the shape of the casing, which can be altered, and also independent of the elevating system shown—a system which can be replaced by another, or entirely done away with, when it is not necessary to maintain the level constant.

Retorts.—No. 149,733.

MERZ & M'LELLAN, of Victoria Street, Westminster, MICHIE, A. C., of Newcastle-upon-Tyne, and WEEKS, E. G., of Monkseaton.

No. 12,111; May 14, 1919.

This invention has for its main object to provide a retort for the low-temperature distillation of fuel "introduced without creating dust



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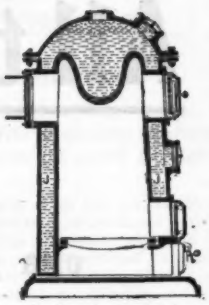

Section showing Water Pocket.

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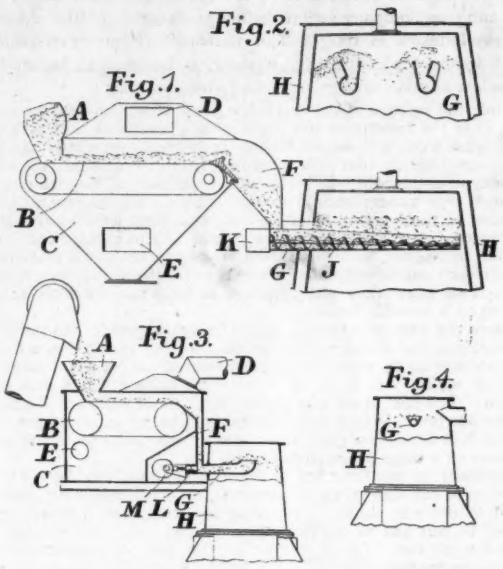
at the surface"—being provided with feeding conduits which enter laterally through the sides of the retort and deliver their fuel in the region of the upper end, but at a level below that intended to be occupied by the surface of the fuel contained in the retort.



Merz and M'Lellan, Michie, and Weeks' Retorts.

Fig. 1 is a section through a pre-heater and upper portion of a retort with a worm feed. Fig. 2 is a section of fig. 1. Fig. 3 is a sectional elevation similar to fig. 1, but showing a modified arrangement. Fig. 4 is a sectional elevation of fig. 3.

In figs. 1 and 2, a hopper A discharges the coal on to a perforated travelling conveyor B in a pre-heated chamber C, having a hot-gas inlet D and a hot-gas outlet E. The coal is discharged through a hopper F into two troughs, which enter the upper end of the retort H at one side and extend across towards the other side, parallel to one another in a horizontal plane. Each trough G contains a worm J connected with driving mechanism in a casing K for feeding the fuel along the trough.

In operation the fuel is fed so rapidly into the retort that it piles up in the troughs and flows over the sides. Thus the troughs remain buried in the fuel, which will usually be highest above the centre-line of each trough, and will slope away to the lowest point between the two troughs and between the troughs and the walls of the retort which face the sides of the troughs.

In the arrangement shown in figs. 3 and 4, one trough only G is shown; and instead of using a worm, the feeding of the coal is effected by a plunger L reciprocated by gearing, such as the eccentric M. The plunger L in its rear position allows fresh preheated fuel to fall in front of it; and on its forward stroke the plunger pushes the fuel along the trough. The plunger would reciprocate (say) 25 times a minute. The material undergoing distillation eventually travels downwardly through the retort and is discharged (by any preferred means) from the lower end

With feed-apparatus of this kind there is said to be little disturbance of the surface of the fuel, as it is continuously slowly rising out of the troughs and flowing over the sides. The movement is such as not to release any large quantity of dust; and thus this is prevented from being carried over to the condensers and bye-product plant. The methods of feeding described have the additional advantage of giving a substantially continuous feed of fuel into the retort, which "has been found preferable to intermittent methods of feeding."

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Sept. 15.]

Nos. 25,572—26,178.

ARROL, R.—"Manufacture of pipe-joints." No. 26,108.
ATKINSON, C. L.—"Distributors for gas-engines." No. 25,675.
BRICE, H.—"Elevators for coal, &c." No. 26,092.
GARRETT, C. S.—"Filling for rectifying-columns of liquor stills or gas-scrubbing towers." No. 26,019.
GENSECKE, W.—"Method of starting gas-turbines." No. 25,851.
SOC. FRANCO-BELGE DE FOURS À COKE.—"Apparatus for causing air or gas to bubble into a liquid." No. 25,880.
SOC. L'AIR LIQUIDE (SOC. ANON. POUR L'ETUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE).—"Direct synthesis of ammonia." No. 25,766.
STEVENSON, F. H.—"Incandescent gas-burners." No. 25,612.
VERAIN, L. F.—"Illuminating devices." No. 25,647.
WILLEMSE, N. J. M.—"Production of water gas." No. 25,750.
WILSON, H. J.—"Distillation of carbonaceous materials and shales." No. 26,114.

We learn that Mr. W. F. Wilson, who for the past eight years has represented the George Wilson Gas-Meter Company in the Manchester district, is no longer in their employ; and they point out that the Mr. Wilson referred to is not in any way related to any member of the firm, and has only been employed by them as a representative—the name being merely a coincidence. A new representative in Mr. Wilson's place will shortly be appointed.

MISCELLANEOUS NEWS.

PUBLIC GAS LIGHTING IN WESTMINSTER.

Notice to Terminate Contract.

At last Thursday's meeting of the Westminster City Council, Mr. George A. Hall (the Chairman of the Works Committee) presented a report in the following terms, dealing with the public gas lighting contract.

We have received and considered a letter from the Gas Light and Coke Company, dated July 30, giving notice in accordance with the agreement of Jan. 29, 1917, between the Company and the City Council, to determine, as on Jan. 31, 1921, the agreement of May 23, 1910 (dealing with the installation and maintenance of public lighting in certain districts of the City of Westminster), as varied by the agreements of Dec. 11, 1915, and Jan. 29, 1917.

The Company state that the principal reasons which have led them to give this notice are indicated in a letter to the City Engineer and Surveyor, of the same date. They express regret that the response of the Council's officers to their request for reasonable consideration of the difficulties in which they have been placed, and which are being steadily overcome, has compelled them to give this notice. The Company, however, add that they would be prepared to withdraw the notice if the Council would agree to reasonable modifications of the terms of the existing agreements, as they are confident that they and the Council are at one in desiring that agreements of this nature should operate fairly and justly to both parties, and that the terms thereof should be reasonably interpreted. In view of the importance of the matter, the Chairman convened a special meeting to go into it, without awaiting the termination of the summer recess.

In their letter to the City Engineer, above referred to, the Company deal with a number of matters the subject of letters to them from the City Engineer—mainly as to lamps giving a light below the contract minimum candle power, and to the failure of the Company to replace defective parts of lamps. The following are extracts from the Company's letter to the City Engineer:

> In my letter of May 12, I stated that the Company were experiencing very great difficulty in obtaining essential parts for the repair of lamps under their contract with the Council, that everything possible was being done to get the lamps in good order, and that any failure to maintain contract candle power could not be ascribed to want of diligence or care on the part of the Company's staff. In view of this statement of facts and definite assurance, and in view of the manner in which the Company, until prevented by circumstances entirely beyond their control, have always carried out their agreements with your Council, your suggestion that the Company had not been giving the matter prompt attention appears to be uncalled for.
>
> The maximum quantity of gas that the lamps can burn with efficiency is being used in all cases. Any further increase in consumption would not result in increased, but decreased, candle power. The lamps are, with few exceptions, giving candle power either in excess of or very close to the contract candle power. The Company are not prepared to agree that tests made by one party to the contract, in the absence of, and without previous notice given to, the other party, are sufficient evidence to entitle the Council to make deductions for damages which they allege they have suffered. In any case, it is obvious that any such tests cannot form a warrant entitling the Council to endeavour to inflict continuing fines upon the Company.
>
> The Company cannot admit that the Council are entitled to recover a sum of 5s. per lamp per day as representing the damage suffered by the Council through alleged deficiency of candle power in any lamp. Such an amount represents far more than the total charge per lamp per day; and, as a matter of fact, the lighting of the streets of Westminster at the present time affords no evidence of damage to the ratepayers, but, on the other hand, is thoroughly efficient. In these circumstances, the true construction of the contract appears to be that the Council are only entitled to recover such amount of damage as they can actually prove they have incurred.
>
> So long as the agreement was being construed reasonably by the officers of the Council, the Company took no exception to the testing arrangements made by the Council, or to the very occasional deductions made in former years in respect of lamps alleged to be below contract candle power, as the Company have never had any desire whatever to take anything but a liberal view of their responsibilities to the Council for the efficient maintenance of the street lighting. When, however, it becomes evident that the officers of the Council are seeking to interpret the agreement, and to harass and penalize the Company, without regard to the equities of the case, the Company are obliged, under advice, to decline, for the reasons given and for others, to recognize any such tests or agree to any deductions from their accounts based upon them.

The Company submit draft conditions in respect of the testing of lamps, under which they would continue the lighting on the present terms. Should these be not agreed, they would be willing to refer the question to the arbitration of an impartial lighting expert.

We need not say that, so far as we are concerned, we should not countenance any action taken on the Council's behalf which could be described as harassing or penalizing the Company without regard to equity, nor do we admit that such action has been taken. We think the matter is one for discussion with the Company, and have accordingly deputed the Mayor, our Chairman, and Vice-Chairman, Alderman Lyon Thomson, and Councillors Heilbuth and Major Low to confer with representatives of the Company with reference to their notice.

The report was received without comment.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Report.

The half-yearly report which the Directors will submit at the meeting on the 30th inst., states that the accounts show a profit on revenue account of £35,051; and after providing for interest on the debenture stock and temporary loans, there remains a sum of £26,428, to which must be added £13,903 brought forward from last account, and a credit from income-tax, making a total of £43,471. The Directors (subject to the approval of the Board of Trade) recommend the maximum dividend authorized by the Temporary Increase of Charges Order on the consolidated ordinary stock at the rate of £3 6s. 3d. p.ct. per annum, less income-tax. This will absorb £25,702, after which a balance of £17,768 will remain to be carried to the next account. The Directors regret having to record the death of two of their colleagues, Mr. John E. Fottrell and Mr. John L. Scallan. The vacancies have been filled by the appointment of Mr. Jeremiah MacVeagh, M.P., and the Right Hon. Laurence Ambrose Waldron, P.C.

A statement appended shows that there were in store on Dec. 31 20,669 tons of common coal; received during last half year, 54,936 tons; carbonized, 54,215 tons; used and sold, 1236 tons; and in store on June 30, 20,154 tons. Of oil, there was in store on Dec. 31 last 280,714 gallons; received during the half year, 861,271 gallons; used and sold, 269,500 gallons; in store on June 30, 872,485 gallons.

The statement of gas made, sold, &c., is as follows: Common gas made, 901,451,000 c.ft., including 247,370,000 c.ft. of carburetted water gas; public lighting, 13 378,000 c.ft.; private lights per meter, 770,232,030 c.ft.; total quantity over, 783,610,000 c.ft.; gas used at works, 17,412,000 c.ft.; quantity accounted for, 801,022,000 c.ft.; gas unaccounted for, 100,429,000 c.ft.

Walsall Gas-Works Results.—The Walsall Corporation Gas Committee's accounts show a net profit for the year ended March 31 of £21,320, after charging £97 allowances to wives and dependants of employees serving with the forces, and reserving £4771, the liability under the Coal Prices Order, as certified by the General Manager (Mr. B. W. Smith). For the twelve months ended March 29, 1919, the net loss was £10,469, after charging war allowances amounting to £611. The Committee are pleased with the result of the year's trading, but point out that, though a satisfactory profit was made, when the heavy loss sustained during the year 1918-19 is taken into consideration, the result of the last two years' trading is an average profit of only £5425 per annum. The Committee are of opinion that, providing existing conditions are maintained, they are in a position to reduce the price of gas to all classes of consumers, and have given instructions for the charge to be lowered from 5s. to 4s. 6d. per 1000 c.ft.

POSITION OF THE GAS INDUSTRY IN ITALY.

Effects of the High Price and Scarcity of Coal.

There has been received from the Director-General of the Anglo-Romano Gas Company an interesting explanation of the situation of the gas industry in Italy. The statement of our correspondent—which we have pleasure in publishing, at his request, for the benefit of readers in this country—is in the following terms:

While the menace of the English miners' strike hovers like a nightmare over the industries and trade of the nation, it is easy to understand what trouble it causes Italian industries—especially gas-works, for which English coal is a vital necessity. We hope you will not consider us as meddlers if, being old customers of English collieries, we urge that miners should reflect upon all the far-reaching consequences of their action, and find an equitable adjustment of their grievances. At the same time, we should like to explain fully to our English colleagues, and those who supply us with raw material, the very difficult conditions under which the Italian gas industry is carried on; and we hope they will continue to maintain business relations with us on a friendly footing.

Before the war, the average price of English coal for the Italian gas undertakings was about 35 lire per ton. It was possible to sell in the largest towns 40 or 50 million cubic metres of gas per year, the average price of which was 14 c. or 16 c. The price of coke was 50 lire per ton. The cost of tar was 35 lire, and that of sulphate of ammonia 300 lire per ton. Wages and salaries and general expenses were about three to four times less than now; and it was possible to reduce the expenses on a large production of gas.

At present we pay for a ton of stored coal about 700 lire. The consumption of gas has fallen to one-half, as compared with that consumed in pre-war times. According to Ministerial Decree, we are obliged to sell gas at a price of 91 c. per cubic metre, and coke at 600 lire per ton. Tar is sold at 425 lire, and sulphate of ammonia at 2200 lire per ton.

From the data given here, it is easy to deduce that, while before the war the cost of the raw material was nearly balanced by the sale of the bye-products, at present the net cost of the coal which we carbonize has gone up to 300 lire per ton. We are sure that such an enormous difference is unknown to our English colleagues, who will realize at what a high price it would be necessary to sell the gas produced in order to balance the cost of production. The Government Bill of Jan. 25 allows the modification of gas contracts in force with the municipalities, and would permit to charge such a price; but this would be at so high a rate that it would hardly be agreeable to customers. In fact, even at present prices, housewives prefer to use wood fuel; and the gas industry is handicapped.

Everybody knows that, in order to increase the sale of gas, it is necessary to sell at a low price and maintain a normal pressure

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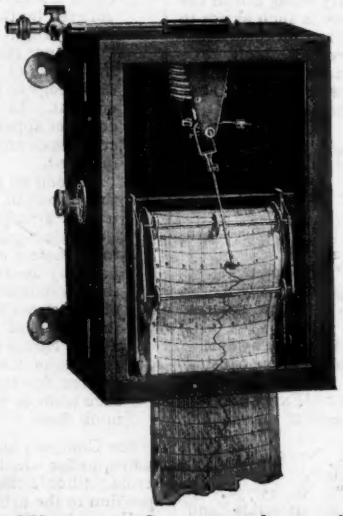
TAPE CHART PATTERN

For Pressure or Vacuum.

NO LIQUIDS USED.



The chart roll is renewed 6 times a year.

The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

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throughout the day, which means increasing the production of gas. But, alas! it is hard work to get coal; and presently the miners' strike threatens to extinguish our furnaces.

Notwithstanding this very difficult and dangerous situation, Italian gas producers are not discouraged. They continue to fight against difficulties, hoping that the immediate future will not be worse than the present, and that their English colleagues and suppliers of raw material will consider their needs in a friendly way.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 20.

The market for tar products continues strong, and the position of pitch is good; makers' price being over 215s. per ton in bulk at works. Creosote is steady and in good demand at from 1s. 3½d. to 1s. 4d. per gallon net in bulk. Pure benzole and pure toluol are at about 4s. to 4s. 3d. per gallon, and 95-160 solvent naphtha about 3s. 6d. per gallon, into buyers' drums at sellers' works. Pyridine bases are quiet; but makers' idea of price is from 20s. to 22s. 6d. per gallon.

Sulphate of ammonia remains unchanged.

Tar Products in the Provinces.

Sept. 20.

The average values for gas-works' products during the week were: Gas-works coal tar, 121s. 6d. to 126s. 6d. Pitch, East Coast, 217s. 6d. to 220s. per ton f.a.s.; West Coast—Manchester, 188s. 6d. to 193s.; Liverpool, 188s. 6d. to 193s.; Clyde, 188s. 6d. to 193s. nominal. Benzole 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 1s. 10d. to 2s. naked at makers' works; 50-90 p.ct. naked, North, 2s. 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 1s. to 1s. 0¼d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 0¼d. Carbolic acid, 60 p.ct., 3s. 11d. to 4s. Naphthalene, £40; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

During August, tar products were exported to the value of £170,023; bringing the total for the eight months of the current year up to £1,925,619. These figures compare with £92,472 and £969,588 in the corresponding periods of 1919. The market generally remains steady, with very little change in values pending the outcome of coal crisis discussions. It is now admitted in many quarters that if a strike is avoided, quotations are about at high-water mark. On the other hand, a strike would naturally be followed by higher prices. In any case, sellers are not inclined to trade far ahead. Pitch is the strongest spot in the market, and would be immediately affected by a strike. Tars also are strong. Naphthalenes are a very good market; crudes being specially wanted for the firelighter trade, which is now in full swing. Up to £30 is being paid for high quality crudes. Solvent naphtha remains slack on lack of buying by rubber manufacturing interests. The rubber trade is temporarily in the doldrums; and it remains to be seen whether the low record price for raw material will stimulate demand. Heavy naphtha continues unchanged. Benzoles are advancing in price gradually. Pyridine is called for, but has not changed in price. Creosote tends towards a higher level. Cresylic acid is fairly well supported; but values are inclined to fall away. Carbolics are almost without friends for the time being, and quotations are nominal. Intermediate products are still scarce. Imports are not of sufficient importance to reduce the demand, and prices are consequently well maintained. Aniline oil and salts are a shade cheaper, and salicylic acid is steady.

The range of quotations is as follows:

Benzole: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 105s. to 110s.; Midlands, 102s. 6d. to 107s. 6d.; North, 100s. to 105s. per ton *ex* works. Refined tar, 85s. per barrel (free) on rail.

Pitch: London, 220s. per ton f.o.b.; East Coast, 215s. per ton; West Coast, 205s., with Manchester 200s. per ton, and Glasgow 210s. per ton; South Wales, 222s. 6d. per ton.

Solvent Naphtha: London, 2s. 10d. to 3s.; Provinces average 2s. 9d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined flake, £60 per ton nominal; inferior, £35; crude, £16 to £30 per ton, according to quality.

Toluol: Naked, 2s. 11d. per gallon nominal. North, 2s. 9d. Pure, 4s.

Creosote: London, 1s. 1½d. to 1s. 2½d.; North, 1s. 1½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 11d. per lb., drums extra.

Aniline Salts: 2s. 2d. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 4d. per gallon; crystals 40%, 10d. per lb.

Salicylic Acid: Technical, 2s. 7d.; B.P., 3s. 3d. per lb.

Xylol: Pure, 6s. 9d.; commercial, 5s. 9d. per gallon.

The "Elite" Gas Interior.

A complete Gas Interior of pleasing design in the Tudor style.

Embodies the patent silent burner, injector, and other internal details of the noted "Entente" Fire.

When conditions permit the fitting of a complete Gas Interior the "Elite" will give entire satisfaction.

We are exhibiting at the Housing and Health Exhibition, Kelvin Hall, Glasgow, 15th Sept. to 9th Oct. We shall be pleased to see you at our stand.

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WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Sulphate of Ammonia.

A good inquiry is still coming forward from home users; but export business is rather less, both as regards demand and also in price. The export price is now about £45 per ton. Exports during August totalled 5356 tons, having a value £198,769. This brings the total for the eight months to 62,868 tons, valued at £1,949,826. These figures compare with 17,340 tons, valued at £386,138, and 44,709 tons, valued at £1,148,396, in the corresponding period a year ago.

Devonport Consulting Engineer's Fees.

A proposal by the Gas Committee of the Plymouth Corporation to increase the fees allowed to Mr. Isaac Carr, the Consulting Engineer of the Devonport Gas-Works, aroused some opposition at the last meeting of the Town Council. The Committee reported having received an application from Mr. Carr for an increase, and recommended that his fees be raised from 2½ to 4 p.ct. on the estimated cost of new works. This is in addition to a retaining fee of £105 per annum, and £9 for each journey to the works. Mr. Moses (leader of the labour party) opposed the recommendation, and argued that the Council ought to take steps to have the appointment abolished. He contended that the Gas Engineer ought to be capable of carrying on the works without the Committee having to refer things to a consultant. Alderman Woollcombe retorted that Mr. Carr was entitled as much as other people to have his remuneration increased to meet the present high level of prices. Mr. Carr's services had been of great value to the Corporation. Mr. Watkins pointed out that, as Mr. Carr's fees were based on the cost of any scheme about which he was consulted, he automatically obtained increased remuneration, owing to the rise in the prices of all material. It was agreed to refer back the minute for further consideration.

Money for Perth Extension Scheme.—A Special Committee of the Perth Town Council have authorized the Town Clerk to make application to the Scottish Office for power to borrow £65,000 to meet the cost of the projected installation of vertical retorts.

Prepayment Meters in North London.—It was reported in "Lloyd's Sunday News" that "many householders in North London districts, who are dependent on penny-in-the-slot meters, have been suddenly deprived of their supply of gas owing to the impossibility of getting any more coins into their meters. This, it is stated, is in consequence of the increased price of gas, and the alteration of the gas-meters to reduce the supply for each penny. Apparently the number of collectors employed by the various companies is not now sufficient for the task of emptying the meters of pennies, and the boxes become so filled with coins that the meter is unworkable, and the gas supply temporarily ceases."

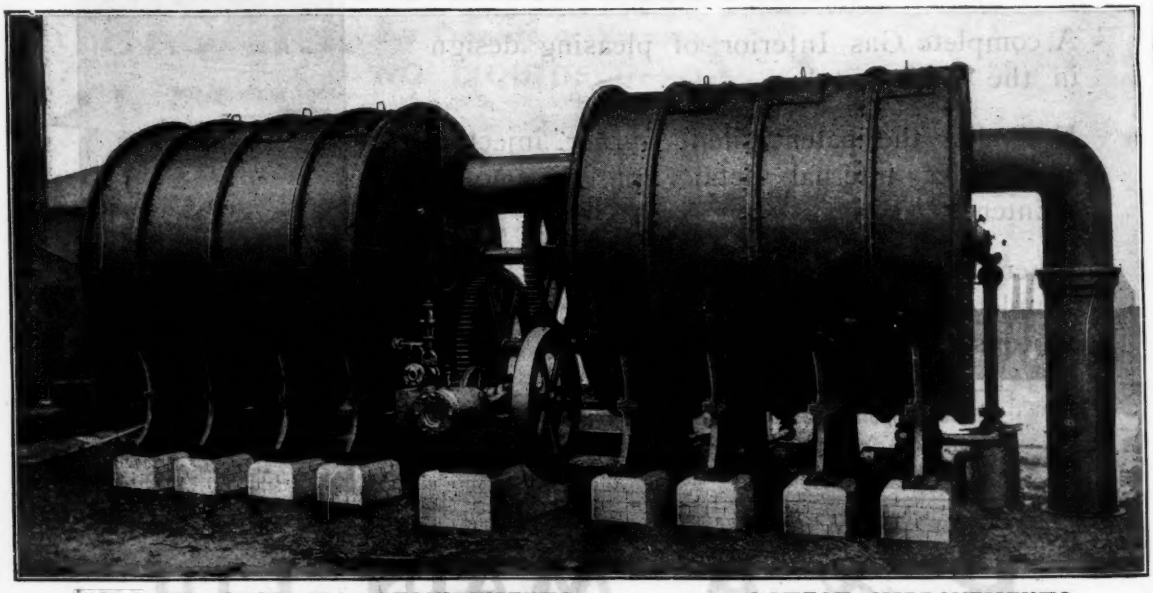
Bungalow Type of Houses at Birmingham.

The difficulties of finding housing accommodation in and around Birmingham have been severely felt by the Housing Commissioner's staff; but, says "Housing," the increase in the amount of the free grant offered by the Government to the private house-builder gave them an opportunity at once of securing houses for themselves and of giving a practical demonstration of what it is possible to achieve with the aid of this grant. The first step was the preparation of suitable plans; and, after due consideration, it was decided that the bungalow type, in view of its low cost, convenience, and attractive appearance, was the most suitable for the purpose. A contract was entered into for building them, at the rate of £940 each, *plus* the Government subsidy. This sum includes the installation of gas and water, and finishing the house ready for occupation. Free use is made in the main kitchen of labour-saving devices; the room being fitted with a gas-cooker, and an independent slow-combustion boiler supplying constant hot water to the sink, the bathroom, the lavatory, and a radiator in the lounge hall. Only one chimney-stack is provided, serving the open fireplace in the lounge-hall and the independent boiler. The remainder of the house is heated by gas-fires; the necessary air being introduced direct from outside the building, and the products of combustion carried off in special 9 in. by 3 in. flues, concealed in the cavity of the wall, and terminating under the eaves in special ventilators made by Messrs. Thomas Ash and Co. The result is both to reduce the cost of building and to increase the attractiveness of the elevation, which is pleasing without useless and meaningless ornament.

Shareholders at Lochmaben Willing to Sell.—The shareholders in the Lochmaben Gas Company are willing to sell the undertaking to the Town Council at a price stated to be £2500. The charge for gas at present is 10s. per 1000 c.ft.; and the Council have under consideration the question of public lighting.

Public Lighting of Bradford.—At a meeting of the Bradford City Council last week, it was stated that the Corporation expenditure for the three months ended June 30 had exceeded the estimates by £68,658, the main items of which included £11,900 for public lighting. At this rate for a year, the city would be faced with the necessity to increase the present rate of 16s. 10d. in the pound by a further 3s. 3½d. Mr. R. Hill raised a protest against inadequate street lighting of the city area, and said that, unless something were done before the next meeting, he would move that the salary of the Gas Engineer be reduced by £50 a year and the whole Gas Committee be "sacked." Three other councillors supported Mr. Hill's complaint. The Chairman of the Finance Committee (Mr. W. Leach) said the over-spending was not really so large as it appeared, because the city had spent nearly £12,000 on street lighting for which it had been impossible to estimate properly after the war years of semi-darkness; and this street lighting expenditure had not been during the three months mentioned.

ROTARY SCRUBBER WASHERS



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Compiling Accident Statistics.

Particulars have been given in the Company's "Bulletin," by Mr. Frederick W. Fisher, of a new method of compiling accident statistics developed by the Safety Department of the Rochester (N.Y.) Gas and Electric Corporation, for the purpose of indicating departmental efficiency in accident prevention throughout the undertaking. It is hoped by the plan set forth to stimulate friendly rivalry between departments, and to concentrate the attention of foremen and superintendents on accident prevention as a means of reducing departmental operating costs. Statistics compiled on the basis of numbers, frequency, and severity of accidents are for various reasons incomplete in the gas and electric business; but costs of accidents, on the other hand, do measure with comparative accuracy their seriousness from a business point of view. Comparisons between departments on any basis must, of course, be equalized to compensate for the difference in size of departments, the character of work done, the skill of employees, and the relative risk involved in the work. Statistics must be published at reasonably frequent intervals, and be fairly up to date. Therefore, the costs of accidents are made-up of expenditure *plus* the reserves or cash set aside by the insurance company at the time the accidents occur to meet the expected costs. This permits a monthly tabulation to be made. Reserves are estimates which experience has shown to be fairly close to the truth. The cost figures include actual payments made. In computing compensation under the New York law, payments are directly dependent on wages. If, therefore, the total losses are divided by the pay-roll, a figure is established which is a measure of the accident loss per unit of pay-roll, and reflects the size of the department and the work involved. Suitable measures are then taken to equalize these losses with the degree of risk in the work of the group. For further comparative purposes, accident costs have been compiled on the basis of loss in terms of production units—*i.e.*, loss per 100,000 c.ft. of gas produced, and per 100,000 kilowatt-hours generated.

Extreme Action Threatened at Rhyl.—The Clerk reported at a meeting of the Rhyl Urban District Council the receipt of a letter from the National Union of General Workers, calling attention to the recent gas award, and stating that men in the employ of the Council were complaining very strongly about the Council not meeting their obligations. The award in question gave the gas-workers an extra 1s. per day or shift, dating from May 1; and it should have been paid at least a month ago. Failing immediate attention to the matter, extreme action would certainly be taken. In the course of a discussion, the Gas Manager (Mr. H. Duxbury) said that the Bangor, Colwyn Bay, and Llandudno authorities were all paying the award; and he understood it had been settled that Rhyl should pay at the same rate as Colwyn Bay and Llandudno. The Clerk having stated that the Council had not undertaken to abide by any award, Mr. Ellis moved that the matter be referred to the Gas Committee with power to act; and this was agreed to.

Scarborough Gas Company's Borrowing Powers.

A special meeting of the Scarborough Gas Company was held last week, with a view to the Directors exercising the extension of the Company's borrowing powers, under the Public Utility Companies (Capital Issues) Act, 1920. The Chairman (Mr. W. S. Rowntree, J.P.) said the last issue of capital was in the first half of 1902. Since then the net capital expenditure had amounted to £29,964—an 11 p.ct. increase on the total capital expenditure at that date. The Company's business had grown at a much greater rate. For the year ended June 30 the make of gas was 438,000,000 c.ft., against 302,000,000 c.ft. for the corresponding period of 1902—an increase of 45 p.ct. The capital account was now overdrawn to the extent of £25,289, which had to be borrowed from the bankers, owing to the impossibility, in recent years, of raising new capital. The Act now gave relief. In 1903, the Company's borrowing powers were £80,833; but under the new Act they would be £137,500. They had actually raised £55,750, and an unissued balance of £81,750 remained. The meeting authorized the Directors to issue mortgages to the amount of £44,250, the difference between the revised borrowing powers and the amount of mortgage issued to date under the Scarborough Gas Act, 1851-95.

Prepared for a Strike at Arbroath.—It has been reported by the Convener of the Gas Committee of the Arbroath Town Council that a coal strike would find them quite prepared at the gas-works, and that for a number of weeks there would be no shortage of gas.

Electric Light Failure at Torquay.—Owing to the failure of the electric lighting in the principal streets, the people of Torquay were put to much inconvenience on Tuesday night of last week. The commencement of the play at the Pavilion was interrupted for half-an-hour, and was then undertaken by the aid of a few motor lamps which were hastily borrowed. At the Theatre Royal, where the performance had started, candles were obtained and used as footlights until the electric lighting was resumed. The breakdown was the worst experienced for years.

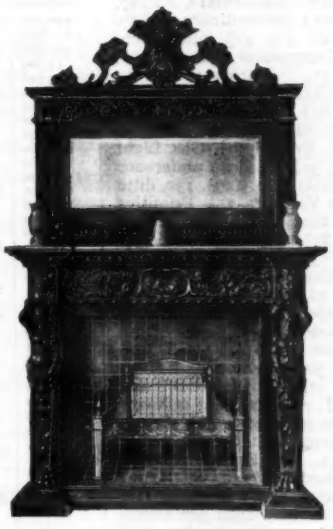
Bexhill Water and Gas Company.—The Directors report that, for the half year ended June 30, the accounts show a balance at credit of profit and loss available for dividend of £6024. They recommend that a dividend be declared for the six months at the rate of 4½ p.ct. per annum on the capital authorized by the Acts of 1885 and 1892, at the rate of £3 3s. p.ct. per annum on the capital authorized by the Act of 1896, Order of 1901, and Act of 1904, and at the rate of 5 p.ct. per annum on the preference share capital, less income-tax. This, with provision for income-tax, will absorb £3272, leaving £2752 to be carried forward to the next account. The Directors regret to announce the death of Mr. John E. Plummer, who was unremitting in his services to the Company; and they announce that they have filled the vacancy by the appointment of Mr. Clifford Holmes Hunt, whose long connection with the Company and technical experience qualify him as a worthy successor.

"They Stand Alone in their Excellence."

The beautiful outline and general artistic appearance of Richmond's "Period" Gasfires introduced a note of high Art into the Gasfire Industry.

The refined design combined with complete silence in burning and unquestioned efficiency enable the most exacting requirements to be met.

The New Patterns for 1920 worthily maintain the previous high standard. Details shortly.



The "Adam."

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GAS STOVE & METER CO., Ltd.
WARRINGTON :: and :: LONDON.

The salary of Mr. R. H. Duxbury, the Engineer and Manager of the Batley Corporation Gas-Works, has been increased by £150, to £550 per annum.

The Directors of the Bexhill Water and Gas Company have instructed Messrs. A. & W. Richards to offer at par £30,000 of 7½ p.ct. debenture stock, to be redeemed at par on Oct. 1, 1930. The interest on this and the existing debenture stock was covered two-and-a-half times by the net revenue for the past twelve months. Applications must be received by Friday morning.

We are informed that Messrs. Peter Lind and Co., reinforced concrete designing engineers and contractors, of Westminster, have been awarded the contract for important new workshops for the Gas Light and Coke Company at the Beckton works. The building, we understand, will be of reinforced concrete throughout, and the erection will be carried out by Lind and Co.'s staff of workmen to the designs prepared in their own engineering department.

During a strike of Corporation employees at Forfar, two magistrates, among other volunteers, have been assisting to maintain the gas supply.

At the annual meeting of the Wem Gas Light and Coke Company, Ltd., the balance-sheet and auditors' report were adopted; and, on the recommendation of the Directors, a dividend of 4½ p.ct. was declared.

A peculiarly sad tragedy was inquired into last Thursday by a Coroner's Jury at Stanhope, who found that a widower named William Brown had wilfully murdered his four children and committed suicide while temporarily insane. The bodies were all found in a bedroom which was full of gas. A board had been taken out of the floor near one of the beds, and a hole made in the ceiling of the room below. There was a piece of rubber piping, which had been connected to a gas-jet in the room beneath the bedroom, and passed up through the hole in the ceiling.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week was at very low pressure; and the tone was variable, but not very bad on the whole. The opening day was very quiet—the Jewish members being absentees; and the tendency was dull on gloomy views regarding labour questions. Things began to improve next day and made some later progress, as the coal position appeared more hopeful, and again on settlement of the electricians' strike; so that the close of the week was noticeably stronger than the start.

The gilt-edged market did not change much. Home Government receded for a while, but recovered later. The big four wound-up with little variation; Friday's figures being: Consols 45⅝-46⅛, War Loan 84 9/16-84⅞, Funding 67⅛-67⅓, Victory 74¾-75¼. Bonds moved similarly; but Corporation issues were down. Indians were depressed.

Home Rails were dull at first, but closed with firmness. Canadians were irregular; but Argentines were steadier.

The Foreign Market was brightened by a big recovery in French loans, and Chinese and Japanese did fairly well.

In the Miscellaneous group, Rubber continued weak, and Oil was variable; but some recovery was effected in Shipping, Textiles, and Iron and Steel.

Business in the Gas Market was fairly active, though not quite up to the level of the preceding week. Movements in values also were less numerous; the greater portion of changes in quotation being *ex div.* adjustments. In the London companies, Gas Light ordinary had a slight recoil (the quotation dropping 2). South Metropolitan was unchanged, and Commercial 4 p.ct. rose 2. The Suburban and Provincial concerns underwent no variation. Among the Foreign undertakings, European increased its steady recovery; but Imperial Continental was 1 lower, and Primitiva preference lost a fraction.

Bargains done for cash during the week were as follows: On Monday, Continental Union 27, European 7 7/16, 7⅞, Gas Light ordinary 58, 59, 59⅛, ditto maximum 40, 40⅛, 40⅜, ditto debenture 47¾, Imperial Continental 128, 130, 131, 132, Monte Video 71, Primitiva 10s., ditto preference 22s. 6d., 24s. 9d., South Metropolitan 63⅛, 64, 64⅛, 64⅜, 65, South Suburban debentures 68, 68⅛. On Tuesday, Bournemouth preference 8, Bristol 59½, Gas Light ordinary 57, 57⅛, 57⅜, 57⅝, 58, ditto preference 55⅛, Imperial Continental 129¼, 129⅜, 130, ditto debenture 84⅛, Monte Video 71, 71⅛, Primitiva preference 21s. 3d., 22s. 6d., South Metropolitan 63, 63⅛, 63⅛, 63⅜, ditto debenture 45⅝, British, Trowbridge 3½ p.ct. debenture 50. On Wednesday, Cape Town 7⅜, 7⅛, Commercial 4 p.ct. 58, Gas Light ordinary 56⅜, 57, 57⅜, 57½, Imperial Continental 129⅛, 131, Primitiva preference 23s., ditto debenture 70, South Metropolitan 63⅛, 64⅛. On Thursday, Brentford "A" 50, Brighton and Hove original 120, British 22⅜, Croydon "B" and "C" 85, European 7⅛, 7½, Gas Light ordinary 56, 56⅛, 56⅜, 57, ditto preference 56⅛, Primitiva 12s., South Metropolitan 63, 64, Felixstowe 7 p.ct. "B" 53. On Friday, Alliance and Dublin 38, Brentford "B" 50, Gas Light ordinary, 56, 56⅛, Imperial Continental 128, 129, 129⅛, Primitiva 10s. 9d., ditto preference 21s. 3d., 22s., South Metropolitan 62, 62½, 63⅛, 64.

In the Money Market, the course of things was much more settled, and all in favour of ease—much to the relief of those who had long been a prey to pessimistic views. Discount rates relaxed materially. The Bank rate is 7 p.ct., as fixed on April 17.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref. .	...	56—61	...
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	38—43	38
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	May 13	7½	8%	Bombay, Ltd. . . .	5¼—6⅛	4¼—5	...
50,000	10	Aug. 12	16	5%	Bourne- (10 p.c. . .	29—30	8⅛—8½	...
383,110	10	,,	7	7%	mouth Gas (B 7 p.c. .	15—15½	8⅛—9⅛	...
115,000	10	,,	6	6/-	and Water (Pref. 6 p.c.	13¼—14	7⅛—8½	8
162,065	—	June 25	—	4%	(4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid. .	261—266	50—55	50
734,920	,,	,,	11	26/3	Do. B New . .	204—209	47—52	50
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	68—73	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb. .	91—93	60—63	...
214,775	,,	Aug. 27	11	7 1/16%	Brighton & Hove Orig. .	208—213	120—125	120
244,200	,,	,,	8	5 1/16%	Do. A Ord. Stk.	154—159	78—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max. . .	...	...	59½
530,000	20	Sept. 15	12½	10%	British	44—45	21—23*	22⅜
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	42—45	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1¼—2½	7—7⅛	7⅛—7⅛
100,000	10	,,	—	4⅛%	Do. 4½ p.c. Pref. .	4—6	5½—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	58
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	..
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69¼—71½	45—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	27
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	...
51,600	,,	Aug. 27	14½	10 1/16%	Croydon A 10 p.c. . .	...	125—135	...
278,400	—	,,	11½	7 1/16%	Croydon B and C 7 p.c.	..	85—95	85
492,270	Stk.	—	6	5%	Derby Con. Stk. . .	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd. . . .	17⅛—18	7—8	7⅛—7⅛
16,298,975	Stk.	July 29	4/17/4	30/-	Gas (4 p.c. Ord. . .	98—102	55—60	56—59⅛
2,600,000	,,	,,	3⅛	26/3	Light (3½ p.c. max. .	76—79	40—45	40—40⅛
4,062,235	,,	,,	4	4%	and (4 p.c. Con. Pref.	96—99	55—58	55⅛—56⅛
4,674,850	,,	June 25	3	3%	Coke (3 p.c. Con. Deb.	72¼—74⅛	45—48	47½
130,000	,,	Dec. 11	10	10%	(10 p.c. Bonds. .	...	...	...
82,500	,,	Sept. 15	5	3 1/16%	Hastings & St. L. 5 p.c.	...	53—58*	...
258,740	,,	,,	3⅛	2 1/16%	Do. 3½ p.c.	87—89	37—39*	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16⅛—16⅜	8¼—9⅛	...
86,600	Stk.	Sept. 15	9	5 1/16%	Hornsey 7 p.c. . . .	...	87—89*	...
131,000	,,	Aug. 12	7⅛	4 1/16%	Ilford A and C . . .	151—154	84—89	...
65,780	,,	,,	6⅛	3 1/16%	Do. B	115—118	64—69	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb. . .	92—94	55—58	...
4,940,000	,,	May 14	9	4 1/16%	Imperial Continental .	150—160	128—133	128—132
1,235,000	,,	Aug. 12	3⅛	3 1/16%	Do. 3½ p.c. Deb. Red.	84—86	82—87	...
235,242	,,	Sept. 15	6⅛	5%	Lea Bridge Ord. 5 p.c. .	119—121	80—85*	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. (A.	211—213	...	...
						(B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3 1/16%	Maidstone 5 p.c. . .	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4⅛—4⅜	1⅜—2⅛	...
250,000	100	April 1	4⅛	4 1/16%	Met. of (4½ p.c. Deb.	99—101	89—96	...
					Melbourne			
541,920	Stk.	May 27	4	6%	Monte Video, Ltd. . .	11⅛—12	70—75	71—71½
1,875,892	,,	July 29	4⅛	3 1/16%	Newcastle & Gatsh'dCon.	98¼—99⅛	60—61	...
529,705	,,	June 25	3⅛	3 1/16%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12⅜—13⅛*	...
55,940	10	,,	7/14/0	58%	,, ,, 7 p.c.	14—15	7⅛—8*	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd. . . .	117—122	98—101	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7⅛—7⅜	2—3	...
60,000	50	Aug. 27	13	7 1/16%	Portsea Island, B . .	128—131	65—70	...
100,000	50	,,	12	6 1/16%	Do. C . .	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅛—6	—⅛	10/—12/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref. .	4⅛—5	1—1⅛	21/3—24/9
521,600	100	June 1	4	4%	Do. 4 p.c. Deb. .	91—93	69—71	70
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	38—43	...
150,000	10	Mar. 26	6	6/-	San Paulo (6 p.c. Pref.	10⅛—11	6⅛—7⅛	...
125,000	50	July 2	5	5%	(5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4%	Do. B	222—224	58—63	...
323,500	,,	,,	10	3 1/16%	Do. C	220—222	53—55	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c. . .	...	...	...
90,000	10	June 25	9	9%	South African . . .	10⅛—11⅛	11—12	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. 4 p.c. Ord..	111—113	61—66	62—65
250,000	,,	July 14	—	5%	Do. Pref. . .	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb..	72½—74⅛	45—47	45⅛
224,820	,,	Aug. 27	8⅛	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3 1/16%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	...
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	68—73	68—68⅛
647,740	,,	May 13	7⅛	3 1/16%	Southampton Ord. . .	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3 1/16%	Tottenham (A 5 p.c. .	135—138	60—65	...
782,275	,,	,,	6	2 1/16%	District (B 3½ p.c. .	115—117	52—57	...
181,255	,,	June 10	4	4%	(4 p.c. Deb.	87—89	60—63	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd. . . .	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3 1/16%	Tynemouth 5 p.c. max.	108⅛—109	71—73*	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 27	8⅛	47/6	Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6⅞	32/6	Do. B 3½ p.c.	129—134	50—55	...
108,075	,,	,,	—	33/3	Do. C . . .	....	50—55	...
140,865	,,	,,	—	33/3	New Ordinary . . .	...	50—55	...
352,000	,,	,,	6⅛	26/3	Wimbledon 5 p.c. . .	117—122	43—48	...
98,000	,,	,,	6⅜	32/6	Epsom 5 p.c. . . .	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk. . .	66—69	44—47	...

* Ex Div.

Clonmel Gas-Workers' Strike.—Clonmel gas-workers, who have been on strike for over a month, last week cut off the town water supply, leaving the inhabitants in sore plight, as water had to be carried from suburban wells. The military were afterwards called out to guard the water-works; the Corporation were then enabled to turn on the supply. The strikers demand an extra 10s. a week, which, the Corporation point out, would mean £2000 a year on the rates. These are already 17s. in the pound. Since the strike many local industries have been crippled; and the streets have remained unscavenged.

Llandudno Gas-Works Extensions.—An agreement with Mr. J. C. Belton, late of Chester, has been entered into by the Llandudno Urban District Council, under which he will advise the Council during the reconstruction of the gas-works which was agreed to a month ago. Contracts have been entered into with various firms for a total amount of £41,536, for the erection of new plant and buildings. When this work is carried out, by the end of June next, the gas manufacturing capacity of the works will, it was stated by Mr. William Thomas (the Chairman of the Gas Committee), be about 1,500,000 c.ft., instead of 500,000 c.ft. as at present.

Woking District Gas Company.—Mr. Samuel Spencer, presiding at the half-yearly meeting of the Company at No. 6, Great Winchester Street, E.C., on Monday of last week, said the consumption of gas during the period under review was 54,260,730 c.ft. The quantity of coal carbonized was 4120 tons, against 3458 tons in the corresponding period of the previous year. There was an increase of 1,963,638 c.ft. in the quantity of gas sold. Since the last meeting, a new gas-holder had been practically completed, and would shortly be brought into use. Mr. J. M. Miles proposed a vote of thanks to the Directors, the Manager (Mr. W. H. Ely), the Secretary (Mr. B. D. Holroyd), and the staff. He said that, in spite of his worries, Mr. Ely was always most courteous when in contact with the consumers. The relations between the management and the employees were excellent. The Chairman, replying to the vote, said the Manager had done his duty admirably, and on one occasion had been in the works for sixty hours at a stretch. Dividends of 3½ p.ct. per annum on the "A" and "B" ordinary stock and 5 p.ct. on the preference stock were declared.

A Loss at Lewes.—It was reported at the meeting of the Lewes Gas Company that the revenue account showed a loss on the working of the past half year amounting to £710. After providing for income-tax and interest on mortgages, &c., the balance of net revenue was £36. Owing to the continued advance in the cost of coal and wages, which still have an upward tendency, the Directors have found it necessary to make application to the Board of Trade for an Order permitting an advance in the price of gas. The Directors regretted that they could not recommend a dividend for the half year. Alderman J. H. Every proposed that dividends be paid out of the reserve fund, as last half year; but this found no seconder.

Gas-Stove Claimed to be Furniture.—During an application at the Lambeth County Court for the fixing of the standard rent of four unfurnished rooms at Denmark Hill, it was stated that the applicant took the rooms at a rental of £2 10s. a week, this including gas for lighting and cooking and the use of the bath room. Counsel for the defendant argued, however, that the case did not come within the terms of the Act, as the renting agreement included the use of furniture in the shape of a gas-stove. The Registrar said he did not think the use of a stove belonging to a gas company could be termed furniture under the Act; but with the consent of both parties, he decided to refer the case to the Judge at his next sitting.

Wexford Gas Company's Extension Scheme.—The Directors of the Wexford Gas Consumers' Company, Ltd., are asking tenders for 1000 irredeemable preference shares of £5, which will be entitled to a preferential dividend at the rate of 7 p.ct. per annum, the object being to add to the capacity of the works, especially by the erection of new carbonizing plant on the vertical retort system, giving an increase of 50 p.ct. over present production, and effecting economies amounting, as estimated, to about £2000 per annum. A contract has been entered into with the Woodall-Duckham Company, Ltd., for an installation of vertical retorts capable of a total make of 250,000 c.ft. of gas per 24 hours. The present issued capital of the Company is £15,000; and the Directors point out that the full dividends allowed under the sliding-scale clauses of the Company's Provisional Order have always been paid.

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ROBERT DEMPSTER & SONS, Ltd., ELLAND, Gas Engineers and Contractors for CARBONIZING PLANTS on Horizontal or Vertical Principles, and Stoking Machinery. HANDLING INSTALLATIONS, including Coal Breaking, Elevating, Conveying Plants and Coke Screening, Storing and Telpherage Plants. PURIFICATION.—All Branches of Wet and Dry Purification. STORAGE.—Gasholders, and all forms of Gas Apparatus. Wire: "DEMPSTER, ELLAND." 'Phones: ELLAND 261, 262, 263.

EXTENSIONS.—Gas-Works requiring Alterations or Additions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, 15, Park Row, Leeds, who make a Speciality of Gas Apparatus, Coke-Oven Plant, and Structural Steel Work. Inquiries Solicited. Satisfaction Guaranteed. Telephone No. 22,579 LEEDS.

INVENTIONS PATENTED. TRADE MARKS REGISTERED. Advice and Handbook free. 35 years' references. Gas Patents a Speciality. KING'S PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 146A, QUEEN VICTORIA STREET, LONDON, E.C.4.

CITY AND GUILDS GAS EXAMINATIONS.

MR. CRANFIELD'S well-known and Long-Established Correspondence Classes prepare Students for these Examinations. Individual Attention Given to Students; and the highest results obtained year by year.
Full Particulars on Application to MANOR COURT AVENUE, NUNEATON.

NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.

Head Office:—Temple Courts,
55, Temple Row,
BIRMINGHAM.

Full particulars for membership, &c., can be obtained from the General Secretary.

COKE-Oven Gas for Town Lighting. PRODUCER GAS PLANT for Low-Grade Fuel, Heating of Ovens, and Displacement of Coke-Oven Gas. Communications to WALTER CHANEY, Eldon Street House, Eldon Street, LONDON, E.C. 2.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

KENT EDUCATION COMMITTEE.

ERITH TECHNICAL INSTITUTE.

REQUIRED, at once, Evening TEACHERS for the following Subjects:—
GAS SUPPLY (City and Guilds of London Syllabus), payment up to 15s.—2 hours.
ELEMENTARY SCIENCE, payment 12s. 6d.—2 hours.
Apply, immediately, to the PRINCIPAL, Technical Institute, Erith Road, BELVEDERE.
E. SALTER DAVIES,
Director of Education.
Sept. 9, 1920.

REPRESENTATIVE Wanted by Firm of Gas Meter Manufacturers for the Manchester District. One who is familiar with, and is known on the ground and capable of taking charge of, a Branch Works.
Apply, stating Qualifications, &c., to No. 6979, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

DRAUGHTSMAN required—one with Wide Experience of Hard Fuel Furnaces and one able to Adapt Designs of Gas Fire and Stove Details for Mass Production, including Jigs and Gauges.
Apply, giving fullest Details of Experience, also Age and Salary required, to The RICHMOND GAS STOVE AND METER COMPANY, LTD., Grappenhall Works, WARRINGTON.

FIRM of Gas-Works Engineers have decided to run Separate Departments in
(1) BENZOL and CHEMICAL PLANTS,
(2) CARBURETTED WATER GAS and PRODUCER GAS PLANTS,
And require DESIGNERS to TAKE CHARGE and DEVELOP.
Communicate, in strict confidence, to No. 6978, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

ROYAL AIR FORCE.

RECRUITS required. — Hydrogen Workers. Age 18 to 28, ex-Service men 38. Good Pay and Exceptional Opportunities of Advancement.
For full Particulars, apply to the INSPECTOR OF RECRUITING, Royal Air Force, 4, Henrietta Street, COVENT GARDEN, W.C. 2.

PLANT, &c., FOR SALE & WANTED

FOR SALE.—One Set of 3 Throw Vertical Geared PUMPS, by Tangyes, having C.I. Plungers 5 in. diam. by 8 in. Stroke, Fast and Loose Pulleys, 2 in. Suction and Delivery; one ditto, 4 in. Plungers by 6 in. Stroke; one ditto, Phosphor Bronze Lined, 4 in. Phosphor Bronze Plungers by 6 in. Stroke, with Fast Pulley. All with Air Vessels.
C. F. DAVIS, 22, Billiter Street, LONDON, E.C. 3.

ONE Boiler Tank, 18 ft. long by 5 ft. 6 in. diam.; two 16 ft. long by 5 ft. diam.; one 15 ft. by 6 ft. diam.; one 10 ft. by 4 ft. diam.; and one 6 ft. by 2 ft. 9 in. diam.
C. F. DAVIS, 22, Billiter Street, LONDON, E.C. 3.

HYDRAULIC Accumulator, Cylinder 8 ft. long, Ram 4 ft. long by 8 in. diam. for 15 Ton Weights. Set of 2-Throw Pumps, 1¼ in. diam. Steel Rams by 1½ in. Stroke with Fast and Loose Pulleys, &c. All by Hollings and Guest.
C. F. DAVIS, 22, Billiter Street, LONDON, E.C. 3.

SET of 3-Throw Belt Driven Hydraulic PUMPS by Smith and Co., Glasgow, having 1¼ in. diam. Gun Metal Rams by 6 in. Stroke, with Fast and Loose Pulleys. Several Sets of Double and Single Ram Pumps in Stock.
C. F. DAVIS, 22, Billiter Street, LONDON, E.C. 3.

ONE S.H. Root's Blower, with Direct Coupled Steam-Engine, complete with Valves, Bye-Pass, and Gas Governor. Capacity, 120,000 c.ft. per hour against 40 in. Pressure; also
One S.H. "P. & A." TAR-EXTRACTOR suitable for a make of 120,000 c.ft. per Hour.
Above may be Inspected at any time at, and further Particulars obtained from, the ST. HELENS COLLIERY AND BRICKWORKS COMPANY, LTD., Siddick, WORKINGTON.

FOR SALE—Small Keith High Pressure PLANT Complete—Gas Engine Tank, One "A" Compressor, 4500 C.P. Lamp, One 1000 C.P. Lamp, and Several Small Do. Only been used for Show Purposes. In Splendid Condition, £60.
Apply to W. S. VENNER, Engineer and Manager, Gas-Works, Brentwood, ESSEX.

A GAS-WORKS Making 3 Millions a Year desires to PURCHASE a Gas Engine-driven EXHAUSTER SET of Suitable Size.
Particulars to Mr. STALEY, Gas-Works, BISHOP'S STORTFORD.

CAST-IRON Tank, 23 ft. 6 in. by 8 ft. 3 in. by 11 ft. 3 in. deep, 12,000 Gallons, Sectional Plates. Ready for Delivery.
FIRTH BLAKELEY, SONS, & Co., LTD., Church Fenton, *via* LEEDS.

CONTRACTS OPEN.

CORPORATION OF CALCUTTA.

NOTICE TO CONTRACTORS.

TENDERS are invited, in Duplicate, for the Supply and Delivery of 2882 One-Light 15-inch SQUARE COPPER STREET LANTERNS, constructed from strong Copper sheets throughout (unpainted), which must be made specially Insect and Dust Proof, Porcelain Reflectors complete, with Scroll Irons, without Ladder Bar and Three Set Screws. These Lanterns must be of suitable size for Single Inverted Incandescent Gas Burner consuming about 3½ to 4 cubic feet per hour; and the Tops of the Lanterns should be hinged. Separate prices to be quoted for ⅜th inch Brass Adaptation Fittings (Seamless Tube) with Unions complete, also 21 oz. Best Quality English Glass Panes for the above Lamps.
Samples of the Copper Lanterns (unpainted) should be forwarded (carriage paid) for Inspection to the Superintendent of Stores, Calcutta Corporation, 149, Lower Circular Road, Calcutta.
Tenders must include Cases and Packing, also delivery Free of all Charges at the Corporation Stores; all articles to be Insured against Breakages and Marine Risks. Delivery must be Completed in July, 1921. Payment will be made for each consignment when Delivery is accepted in terms of the Contract, which a successful tenderer is required to execute within two months from the acceptance of his Tender.
The Corporation do not bind themselves to accept the lowest or any Tender, and will be at liberty to accept the whole or part of a Tender. No Tender will be considered unless accompanied by a remittance to the extent of 2½ per cent. on the total value of such Tender. All rates should be quoted both in words and figures; and the Tender should remain open for acceptance for three months from the date of opening the same. Tenderers must abide by the rules in regard to Tenders which are in vogue in the Corporation.
Each Tender, in duplicate, must be enclosed in a sealed cover and superscribed "Tender for Copper Street Lanterns." Tenders will be received by the Deputy Chairman up to 2 p.m. on Monday, the 22nd November, 1920, when they will be opened in the presence of such Tenderers as may be present. Tenderers may submit their Offers on their own Forms.
J. C. MUKERJEA,
Secretary to the Corporation.
Central Municipal Office,
Calcutta,
Aug. 13, 1920.

PATENT NOTICE.

THE Inventor of Provisional Patent No. 25,020, relating to a System of COMPLETE CARBONIZATION, invites Inquiries from any interested Agents or Manufacturers wishing to undertake the Supply and Erection of the Plant. It is for the production of Coal, Water, or other Gas, by a very economical and novel means. Capable of producing about 70,000 c.ft. of Gas per Ton of Coal Carbonized, the calorific power of which can be regulated at will. The whole can be erected in a small space, at a very low cost, and is especially suitable for small or medium-sized works.
For further Particulars, apply to Mr. HERBERT BANYARD, Engineer and Manager, Gas-Works, Murston SITTINGBOURNE.

COMPANY NOTICE.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Chief Office, No. 11, George Yard, Lombard Street, in the City of London, on Wednesday, the 29th day of September, at Twelve o'clock noon precisely, to receive the Report of the Directors and the Statement of Accounts for the Half Year ended June 30, 1920; to declare a Dividend; to elect Two Directors; to appoint Two Auditors; and to deal with any business that may be legally transacted at an Ordinary General Meeting.
NOTICE IS HEREBY ALSO GIVEN that the TRANSFER BOOKS of the Company WILL BE CLOSED from the 14th inst. to the 29th inst.
By order of the Court of Directors,
A. W. BROOKES,
Secretary.
Chief Office: No. 11, George Yard,
Lombard Street, London, E.C. 3,
Sept. 13, 1920.

STOCKS AND SHARES.

New Issue of Capital by Order of the Directors of the **BEXHILL WATER AND GAS COMPANY.** (Incorporated 1885.)

MESSRS. A. & W. RICHARDS (William Richards) are Instructed by the Directors to Issue £30,000 7½ PER CENT. DEBENTURE STOCK.
Price of Issue, Par.
Redemption at Par Oct. 1, 1930.
The Interest on the existing Debenture Stock and on the amount now being raised requires £4170 per annum, such Interest being a First Charge on the Net Revenue of the Company which for the Twelve Months ended on the 30th of June last was £10,027.
The present Issue of Capital is being made to pay for Extensions of Works and Plant necessitated by the increasing demand for Water and Gas.
Prospectus and Forms of Application may be obtained of the SECRETARY of the Company, at the Offices, 5, Sea Road, BEXHILL-ON-SEA, and of Messrs. A. & W. RICHARDS, 37, WALBROOK, E.C. 4. Tel. No. City 3833.

JOHN HALL & CO. OF STOURBRIDGE LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods
RETORTS CAREFULLY PACKED FOR SHIPMENT.

TROTTER, HAINES, & CORBETT LIMITED.
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS. Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

A. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LOCKS. 5, LEIGHTON ROAD, KENTISH TOWN, N.W.
H. & J. DEMPSTER, LTD., CONNAUGHT MARSHES, 24, VICTORIA STREET, S.W. 1. MANCHESTER.